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RETURN TO MAIN FILE

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## FOREWORD

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HERALD OF COMMUNICATIONS

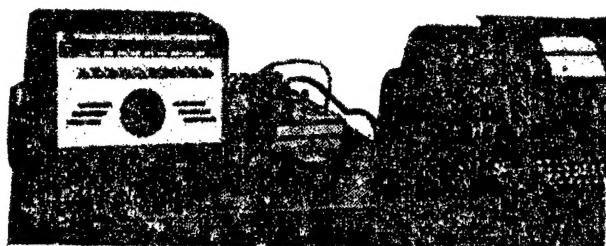
No. 2, 1958

[Following is a complete translation of Vestnik Svyazi (English version above), issue No. 2, (215), February 1958. Both covers and the Table of Contents of this Russian language publication were included in the translation.]

TYPE ATA-M SMALL-CAPACITY SUBSCRIBER TELEGRAPH STATION  
(Teletype)

The type ATA-M station is designed for work in the Oblast and Rayon centers of subscriber telegraph networks. It is designed to service ten subscriber telegraph units and three channels for voice-frequency telegraphy. One of the subscriber units serves as the telegraph equipment station.

Subscriber units can be connected to the station either by a two-wire or a single-wire circuit, while the voice-frequency telegraph channels, which are used for connecting the subscriber telegraph with its main station, are connected by means of a four-wire circuit.



The station design makes it possible to dial in advance the number and direct the outgoing calls either to its main ("higher") station (by dialing the numeral "1"),



or to the station telegraph apparatus of its own station.  
(by dialing the numeral "0").

The station is supplied with power from a d-c  $\pm 60$  v source (with the mid-point grounded). The motor circuit of the station apparatus and one of the station's signal circuits are supplied with power from an a-c 127 v network. The motor circuit can also be supplied with power from a d-c 120 v source.

The type ATA-M station equipment is shown on the photos.



### TYPE ZPEM-2 PORTABLE ELECTROMEGAPHONE

The type ZPEM-2 electromegaphone is intended for increasing the loudness of commands, messages, etc. It consists of a miniature electrodynamic microphone, a 3-watt amplifier containing five semiconductor triodes and a horn-type loud speaker.

The microphone is attached to the loud speaker by means of a plug-type adapter (if necessary, it can be removed from the loud speaker to a distance of several meters). For convenient operation, the loud speaker is equipped with a handle on which is located a pushbutton for closing the circuit

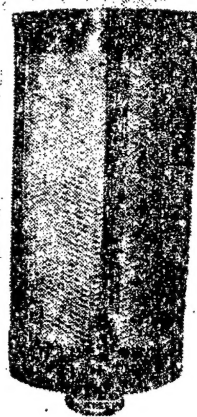


The amplifier is kept in a small case with a shoulder belt. The amplifier can be supplied with power either from a dry battery or from an outside source of d-c with a voltage of (original text in part illegible)

ACOUSTIC COLUMNS FOR TRANSMISSION OF SOUND  
IN BUILDINGS AND OPEN SPACES

The Institute of Radio-broadcasting Reception and Acoustics has developed sound-producing acoustic columns with a power range of 10,25 and 50 watts. The columns are intended for the transmission of sound in buildings and open spaces; their performance is of very high quality.

The acoustic assembly of columns for use in buildings is enclosed in a wooden polished case. The photo shows an acoustic column with a power of 50 watts, which is intended for use in buildings.



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## EXCELLENT COMMUNICATION SERVICE FOR THE SOVNARKHOZES

The reorganization of the administration of industry and building construction by economic administrative regions, carried out in accordance with the decisions of the Communist Party and the Soviet Government, has brought industrial leadership right into the plant. As a result, in 1957 industrial output rose by 10 percent instead of the 7.1 percent envisaged by the plan. The regional economic councils are facing important problems posed by a further, even greater upsurge of socialist industry.

Under the new conditions of industrial administration communications are called upon to play an exceptionally important part. The sovnarkhozes need communications in order to operate the many plants, factories, mines, construction projects under their management, and in order to maintain business contact with sovnarkhozes and enterprises in other economic administrative regions.

During the period that has elapsed since the establishment of the sovnarkhozes, the ministries of communications of the Republics and local communications administrations have taken a number of measures to meet their communications requirements. The premises of the sovnarkhozes have been furnished with telephone and radio equipment. Many communications administrations drafted and submitted to the sovnarkhozes for consideration telephone and telegraph projects for their respective economic administrative regions. This involved indicating what work in set-

ting up the communications had to be done first and making provision for subsequent expansion of the communications network. In carrying out the work local potential and resources were drawn upon. The republican ministries of communications furnished telephone cable for the premises of the sovnarkhozes, set up telephone exchanges, organized new long-distance telephone-telegraph circuits. This was done, for instance, by the ministries of communications RSFSR, UkSSR and many communications administrations of Ukraine, Belorussia, Kazakhstan and other republics. The ministry of communications Latvian SSR has not confined itself to working out a plan of expanding the network of telephone-telegraph communications, subscription telegraph and DGTS for conferences by wire but intends to create a special dispatch service for the sovnarkhoz. Ministry of communications of the Russian Federation jointly with the sovnarkhoz of Moskovskaya Oblast is planning to carry out extensive work in developing communications with the points where industrial enterprises of the oblast are concentrated. In the future it is planned to make communications between the Sovnarkhoz of Moskovskaya Oblast and enterprises under its management completely automatic.

The measures taken by republican ministries and local communications administrations in reorganizing the communications network, setting up additional channels, constructing and putting into operation new equipment and servicing the sovnarkhozes with postal communications are only the beginning of the enormous task which the communications organs have to carry out in order to fully satisfy the communications



needs of the sovnarkhozes.

In the process of organizing and developing communications for the sovnarkhozes the communications workers have had to face many new problems and difficulties. For example, a complicated problem was presented by the communications requirements of those sovnarkhozes which have under their management enterprises located in different administrative regions. In UkSSR, for instance, eleven economic administrative districts cover industrial enterprises located in all of the twenty six regions of the Republic. When the industrial enterprises in these regions belonged to different industrial ministries there was no need for extensive communications between the enterprises. Now there is a need for communications between the industrial enterprises within each economic district as well as between the individual sovnarkhozes.

It must be noted that even in the economic administrative districts in which the border of the district coincides with those of the oblast or the kray [political administrative units] and where communications had been built up over a long period of time, they were found to be inadequate for the requirements of the sovnarkhozes. It must also be remembered that communications facilities have to be developed in order to provide better service to local government and party organizations, the public, local industrial enterprises not under the sovnarkhozes, to newspapers for the transmission of TASS material etc.

Communications authorities must proceed immediately to do their

utmost to organize first-rate servicing of sovnarkhozes with all existing types of communications. In planning communications facilities development over the 1959-1965 period, special attention must be given to the task of providing the sovnarkhozes with reliable, smoothly functioning communications.

There is a great deal to do to provide the needed volume of communications facilities for the sovnarkhozes of such districts as the Khabarovskiy, Krasnoyarskiy, Sverdlovskiy, Permskiy, Chelyabinskiy and Moskovskiy as well as for the sovnarkhozes of the Ukraine, Belorussia, Kazakhstan and others. For example, a link between the sovnarkhoz of the Yakutsk economic district and one point in diamond-mining industry area requires a communications circuit over a distance of 900 kilometers. It is also necessary to strengthen communications between different economic districts, for example, between those of the Ural, and the Ukraine with Siberia, of the Far East with Leningrad and with other centrally located districts.

In accordance with the Government's decision, the communications' trunk lines which had formerly belonged to the various industrial ministries that were abolished, have now been transferred to the management of the USSR Ministry of Communications. This makes for more intensive utilization of communications channels and for a greater number of long-distance calls. However, the local communications lines of the abolished industrial ministries in a number of economic administrative districts of the Union Republics have as yet

not been transferred to the communications authorities. Communications administrations must jointly with local party and Government organizations take steps to speed up this transfer, which will considerably improve long-distance services to the sovnarkhozes and the enterprises under their management. For reasons of expediency, internal communications lines within industries should be left under the direct management of the sovnarkhozes. The Ministries of Communications of the respective Republics, as well as the Branch and Planning and Finance administrations of the USSR Ministry of Communications should deal with the matter of introducing new ways of operating communications facilities more suited to the sovnarkhozes and should also revise rates.

In many economic districts the communications authorities have established business contact with the sovnarkhozes and the latter are helping communications workers to improve and expand communications facilities. Most valuable has been the experience of the RSFSR Ministry of Communications in organizing communications for the Moskovskaya Oblast sovnarkhoz. In that oblast there were no communications installations which had belonged to the disbanded industrial ministries, and so the sovnarkhoz is using general government facilities. A special procedure was set up for processing sovnarkhoz long-distance calls; a plan was drawn up for expanding communications to the points where the enterprises managed by the sovnarkhoz were concentrated, etc. The work envisaged in the

plan will be carried out with the help of sovmarkhoz funds.

In some economic administration districts a number of measures are being planned to enable sovmarkhozes to have convenient round-the-clock communications with their enterprises. The Ministries of communications of the Republics and regional (territorial) communications administrations must give careful consideration to the interests and needs of the sovmarkhozes and see that such measures are applied as fully and broadly as possible.

Of course, a factor of tremendous importance for the fulfillment of economic production plans is co-operation between the efforts of industrial enterprises of different economic districts. In order to correctly coordinate the activities of related enterprises, the sovmarkhoz concerned must be able to put them in touch with each other without delay, to provide operational solutions for problems as they arise. The Ministries of Communications of the Union Republics, the regional and the territorial communications administrations have a duty to study the long-distance telephone and telegraph needs of the sovmarkhozes, the volume and destination of long-distance telephone calls and telegrams and to take appropriate steps to most effectively organize and speed up the transmission of long-distance calls and subscription telegraph messages, as well as the delivery of telegrams. With this in view, the working schedules of long-distance telephone exchanges should be revised, certain hours should be set aside for pre-arranged telephone calls, and telegrams and

all the requests for long-distance calls should be handled with the greatest efficiency. The solution of this problem should also be facilitated by the work being done by the Ministry of Communications USSR in developing cable and radio communications channels on inter-Republic and other main lines as well as by the work of republican ministries in developing intra-Republic and intra-regional communications.

Communications agencies, taking into account the role of the Gosplan of the USSR as well as of the Gosplans of the Union Republics and of distribution organizations must improve by every means their telephone, telegraph and postal services. The Gosplans must be able to communicate with the scientific research institutes, planning institutes, designing offices and laboratories which are directly under their control.

Construction organizations must successfully fulfil the plans regarding the new communications installations which are scheduled to become operational in 1958, and communications personnel must make more extensive use of available resources.

At a recent conference of representatives of Ukrainian SSR sovnarkhozes held in Kiev--and reported on in the pages of "Pravda"--attention was drawn to the need for really business-like relations between the Gosplans of the Republics and the sovnarkhozes, and for a reduction in the flood of paper coming from the central Gosplan. In this matter, communications agencies can be of great

assistance to the Gosplans and sovnarkhozes by enabling through-communications facilities to deal with problems more rapidly and efficiently.

In servicing the sovnarkhozes an important role should be played by subscription telegraph. (Teletype). However, it is still not very popular. The reason is that the sovnarkhozes still do not have experience in the use of this type of communications, and communications administrations are not showing any initiative in demonstrating its advantages to the sovnarkhozes. Greater use of subscription telegraph is also rendered difficult by the inadequate development of the network of lines between central telegraph stations and stations in places where industrial enterprises are concentrated.

The expansion of subscription telegraph and the inclusion of the sovnarkhozes and the enterprises under their direction, as well as of the Gosplans and the distribution organizations in the subscription telegraph network are very important and most suitable as a means of providing operational contact in written form between the sovnarkhozes and their enterprises, planning and distribution organizations, between sovnarkhozes of different economic districts in dealing with problems connected with cooperation in production, for transmitting urgent messages, documents, orders, inquiries, etc. Subscription telegraph is also very convenient for communications control.

Also of great importance is phototelegraphy, and first of all the new phototelegraphy equipment, which produce copy without the use of photographic processes. The wide use of such equipment will depend wholly on the extent to which targets are met by industry, which is to speed up production.

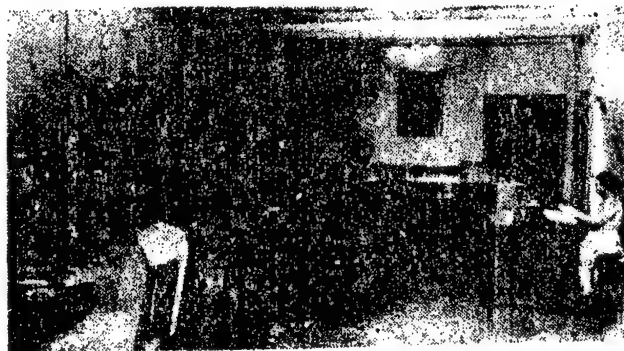
Inspired by the grandiose objectives of communist construction in our country which have been set before the Soviet people by the Party, communications workers are full of determination unceasingly to improve and expand communications facilities in the interests of fuller satisfaction of the needs of the sovnarkhozes of economic administrative districts, and this in turn will promote the further upsurge of our country's economy.

### THE FRUNZE LONG-DISTANCE TELEPHONE STATION

The new long-distance telephone station, which opened last year in the city of Frunze (Kirgizskaya SSR), is equipped with modern apparatus produced in our country.

The new MTS /long-distance telephone station/ has a spacious well equipped public telephone room and the necessary quarters for the service personnel.

Shown on the photo to the right is the switchboard room of the Frunze MTS, to the left is shown the public telephone room.





CONFERENCE ON THE PREPARATION OF A PERSPECTIVE  
PLAN FOR THE DEVELOPMENT OF COMMUNICATION  
FACILITIES, RADIO BROADCASTING AND TELEVISION

The conference was held in Moscow from 6 to 10 January of this year; it was called by the Ministry of Communications USSR and its purpose was to discuss the project for a perspective plan of developing during 1959-1965 the communications facilities, radio broadcasting and television for the entire country.

Taking part in the conference were the leading workers of the Ministry of Communications USSR, the Ministers of Communications of the Republics of the Soviet Union, representatives of scientific-research and design institutes, Central Design Bureau, construction organizations, Moscow communications enterprises, Central Committee of communications workers unions and autotransport and highway workers.

The conference heard and discussed the report of the assistant Minister of Communications USSR, K.Ya. Sergeychuk, on "The prospects for developing the country-wide communications facilities, radio broad-

casting and television during the 1959-1965 period"

There were five sections (long-distance telephone telegraph service; radio communications, radio broadcasting and television; city telephone service; Rayon-wide electrical communications and radiofication; postal service and distribution of printed matter) in which the participants have discussed the reports submitted by the managers of the branch offices of the Ministry of Communications USSR on the prospects for developing the individual branches of communications and their recommendations for working out the plan for the coming 7-year period.

A brief report on the conference is printed below.

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FROM THE REPORT OF THE DEPUTY MINISTER OF  
COMMUNICATIONS USSR, K.Ya. SERGEYCHUK

In his report, comrade Sergeychuk outlined the present state of the country-wide net of communications and gave a detailed description of the preliminary project developed by the Ministry of Communications USSR of a perspective plan for the development of the country-wide communications

facilities, radio broadcasting and television during the 1959-1965 period.

The basic task imposed by the 1959-1965 perspective plan for the development of communications facilities is the further uplift of the long-distance telephone-telegraph service, radio broadcasting and television, which is to be based on the creation of high-power channel groups for communications between the economically interdependent Rayons. It is necessary to achieve a faster passage of mail and telegraph messages, reduce the waiting time for long-distance calls, develop extensively radiofication and further growth of the municipal, Rayon-wide and suburban telephone networks. This will make it possible to furnish complete and high-quality service to the national economy, governing organs and the population. Special care should be taken to satisfy the requirements of the Sovnarkhozes of the economic and administrative regions, also the requirements of the Eastern regions of the country, where the development of the natural resources will be on a large scale.

A no-delay long-distance call system must be established for a number of the principal routes, while the entire long-distance telephone network must be able to service calls with a waiting time of no more than 30 minutes.

As a rule, telegrams from the sender must reach the addressee in time, not later than 5-8 hours after the telegram was sent; mail between Moscow and all Republic, Kray and Oblast centers and between centers of the Oblasts should be delivered within two-three days.

It is planned to effect a further development and reconstruction of the technical facilities of communications, broadcasting and television, which will be based on the introduction of radio-relay lines, high-frequency symmetrical and coaxial cables, uhf-fm transmitters and automation of production processes. The development and perfection of the communications and broadcasting facilities must be based on a higher stability of operations and reduced cost of equipment through the use of semiconductors, new vacuum devices, magnetic materials, miniaturized parts and more economical electric power supply.

Special attention should be given for a better service to the population and better quality of work in all branches of the communications economy, reduction in cost of communications services and better profits for enterprises and the communications economy as a whole.

The basic direction of the technical policy to be

taken in the field of electrical communications should be a larger number of communications channels with a simultaneous considerable reduction of their cost. Accordingly, it will be necessary to develop and introduce in practice new technical facilities for communications which will make it possible to reduce considerably the capital expenditures per unit of introduced power.

The multiplexing of balanced and coaxial cables by using high-frequency equipment will make it possible to use less expensive cables for large channel-groups. The introduction of transistorized amplifying equipment will make it possible to reduce considerably the size and power of the sources of electrical supply and to automate their servicing. The result of this will be a lower cost for the booster stations, with most of these (on both the main and Oblast-wide lines) needing no service by attendants. Of special importance will be the application of semiconductors for the boosting and terminal equipment in the Oblast-wide and Rayon-wide communications, since the rural districts often lack a steady supply of electric power. Of extreme importance will be the construction of long-distance telephone-telegraph lines inside the economic Rayons of the country to provide communications between the Sovnarkhozes and their subordinate enterprises.

The adoption of the simplified equipment for multiplexing the GTS /city telephone service/ cables, which is now in the development stage, will reduce considerably the cost of construction of city and suburban communications. Lower costs will be effected not only by the installation of multi-channel radio-relay lines, but also by radio-relay lines of a new type-- with relay points every 200-300 km, instead of every 50-60 km and passive relaying. Greater use of uhf-fm broadcasting will make it possible to organize multiprogram broadcasting of excellent quality with a minimum of capital expenditures.

Of exceptional importance in the development of communications should be the modernization of the existing installations and equipment for the purpose of increasing the carrying capacity and stability of operation of the communications. Of tremendous importance for the development of communications will also be the utilization of the standby equipment at the existing installations by multiplexing the overhead and main cable lines with a multichannel system; high-power equipment and apparatus; improved methods of through connections. The utilization of the standbys at the overhead and cable lines will make it possible to establish, additionally, hundreds and thousands of

kilometers of channels with a capital investment per channel several times smaller than it would cost in constructing of new lines.

Automation of control, measurement and inspection of electrical communications facilities, which increases considerably the labor productivity, reduces operating costs and speeds-up the execution of connections, must have for its ultimate aim the creation of non-serviced enterprises engaged in wire communications, radio communications and broadcasting. Extensive mechanization of heavy and time-consuming labor, especially in large postal centers, will be an important factor in raising the labor productivity during the construction and repair of communications installations. It is necessary to reduce the time and cost of construction by adopting industrial methods.

It is planned for the coming 7-year period to develop new communications systems to be based on the statistical properties of the transmitted signal, which make it possible to increase by several times the utilization of the frequency spectrum used by high-frequency telephone systems, photo communications channels and television. Also to be accomplished must be the development of an electronic ATS /automatic telephone station/ and new types of telegraph

instruments.

Of great value will be the organizational and technical measures, which make it possible to expand considerably the capacity of telephone-telegraph communications, use for the latter radio-relay lines, which are constructed and financed from the local budget for television broadcasting, also the communications lines constructed by other ministries and departments along the gas and oil transmission lines, power systems, railroads, etc.

The rest of his report, comrade Sergeychuk devoted to the detailed description of the concrete problems confronting each branch of communications during the period of the plan.

\* \* \*

The report by comrade Sergeychuk was followed by discussions. In their statements the participants emphasized that the communications organs of the Republics of the Soviet Union with the aid of Party and Soviet organizations have done much work to develop all forms of communications, but the growing requirements of the national economy and population are not yet fully satisfied. The participants spoke about the measures taken for further uplift of the communications economy and drew the attention to the



unsolved problems, lag in the development of certain branches of communications and pointed to the necessity of utilizing the standbys and local resources. A number of complaints was lodged by them against the Ministry of Communications USSR, the planning organs, industry and scientific-research communications institutes.

The Minister of Communications of the Ukrainian SSR, I.T. Kirichenko, reported that the project for the perspective plan for the Republic provides for large capital investments for all branches of communications. Serious attention will be given to the development of telephone service in the cities of the Republic. During the planned period, there will take place the construction of high-power radio stations, selected receiving places, 4 television centers and 18 television relay stations. It is planned to equip all television centers and stations with uhf-fm transmitters in order to establish a two-program broadcasting.

Economically, radiofication in certain Rayons of the Republic is more expedient to effect by installing in the homes simple and cheap uhf-fm receivers.

In order to improve sharply the Rayon-wide telephone service /VRS/ and to provide the VRS subscribers with an

outlet to the long-distance telephone network, it is necessary tha LTU /line-equipment office/ should be the one to take care of repairs, maintenance and operation of the line and station equipment of the VRS. The experience of many Oblasts of the Ukraine confirms the effectiveness of such measures.

The Minister of Communications RSFSR, A.V. Cherenkov, spoke about the projected measures to be taken for the development of all communications branches of the RSFSR during the 1959-1965 period. He cited data proving the increased profitableness of the communications economy of the Russian Federation during the last few years and emphasized that the requirements for better economic results and increased profitableness must play a leading part in the plan. Comrade Cherenkov stated that special attention will given to the further development of communications facilities in the Northern and Far-Eastern regions.

It is necessary to eliminate the disproportion between the tremendous growth of residential buildings in the cities and the development of city telephone service. It is also very important to correct the technical lag of VRS as compared with other forms of electrical communications.

Serious attention should be devoted to a system of

multiprogram broadcasting. The latter must be such that it will make it possible to make use of the existing radiofication network.

Sufficient money resources is provided by the Sovnarkhozes for the expansion of interurban communications, but we are unable to use them due to the shortage of equipment.

The Kazakh SSR has nine Sovnarkhozes, stated the Minister of the Republic, A.A. Noskov, not all of them, however, have good communications with their subordinate enterprises. This deficiency can be corrected in the near future, provided the industry will produce equipment and repair materials in necessary volume. The production of materials and equipment should be organized at the enterprises of the Sovnarkhozes. For example, Kazakhstan has big deposits of kaolin which can be made into insulators; there is a possibility of producing bimetallic wires, etc. We submit these problems to the government, but much time is taken for a decision. In accordance with the proposals of the republic ministries, the Ministry of communications of the Soviet Union should apply to the respective directive organs with the request for having the Sovnarkhoz enterprises produce the materials, equipment and apparatus for the communications economy.

In the economic life of Kazakhstan, said comrade Noskov, pasture animal husbandry occupies a prominent place, and we devote much attention to improve the communications and radio service for the husbandmen. We should provide them with good portable radio receivers and a large supply of sources of power. Such transistorized receivers are present, but are not produced in adequate quantities.

In the opinion of the Minister of Communications of the Estonian SSR, O.Kh. Rupsiy, the perspective plan should establish different tasks for the Republics and take into account the real possibilities of overcoming the lag of certain branches of communications.

Continuous radiofication in Estonia should be based on uhf-fm broadcasting. All rediffusion stations in the Republic are equipped with radio receivers operating in the ultrashort wave range, which made it possible to improve the audibility and quality of the broadcasting. The Ministry of Communications of the Republic made an agreement with the Committee on radio broadcasting and television to have the ultrashort wave radio station transmit an additional program, not the one which is relayed from the main broadcasting stations.

The importance of saving now metal is well known. Yet, the weight of the towers used in radio-relay lines reaches up to 150 ton. It will be more economical to construct light-weight towers from reenforced concrete, or of a much simpler design.

At the end of last year, said the Minister of Communications of the Moldavian SSR, A.Kh. Khomenko, we made a comparative analysis of the state of all forms of communications in the Republic. It was established the communications in the Rayons were developed without taking into consideration the special features in the economics and cultural structure of the Rayons, and without finding out to what extent are the population's requirements satisfied by the communications services. In planning the development of communications facilities for the next few years, the Ministry of Communications of the Republic took measures to eliminate this deficiency.

In order to improve the long-distance telephone service to the population, it is planned to create tens of republic-wide high-frequency channels using own resources for this purpose. The net of public telephones will be expanded considerably by the communications branches. The Ministry of Communications USSR does little to solve the

problems connected with mechanization of heavy work at the postal enterprises and other branches of communications. For example, as yet there are no mechanisms for the installation of reenforced concrete poles.

The Minister of Communications of the Latvian SSR, A.F. Aleksandrov, emphasized that large capital investments for the communications economy can bring benefits only by taking advantage of the latest achievements in science and engineering to develop more perfect and less expensive equipment and by devising steps to reduce the operating cost.

It is necessary for our industry to meet higher requirements in the production of apparatus and equipment for communications. Good samples of apparatus can be seen at exhibitions, but, unfortunately, batch production of many types of apparatus is not yet an accomplished fact.

The Minister of Communications of the Lithuanian SSR, N.M. Belyanin, drew the attention to the necessity of establishing closer business relations with the Gosplan USSR. Experience shows that the communications branch of the Gosplan USSR is not yet exerting its influence in planning.

Comrade Belyaning criticised the action of the workers of the Ministry of Finances USSR who, upon the examination of the plan, reduce without any reason the capital investments and force their own proposals upon the republics of the Soviet Union, irrespective of the opinion and plans of the directive organs of the republics.

The reporter has pointed out, said the Minister of Communications of the Uzbek SSR, M.A. Sharkov, that the plan problem to be solved during the planned period is to develop the long-distance telephone service. In our opinion, the republic needs the development of both the long-distance and city telephone network.

The government of the republic appropriates every year larger and larger sums for the development and improvement of communications facilities. In this we also get help from the Sovnarkhozes. For example, the Ferganskiy Sovnarkhoz had appropriated 1 million rubles for the construction of an ATS. Our main problem now is to get the necessary equipment and apparatus.

The directive organs must see to it that materials for telephone installations should be supplied to kolkhozes and sovkhoses in accordance with a plan.

It is necessary, said the Minister of Communications of the Belorussian SSR, P.V. Afanasyev, for the Soviet Union and republic gosplans, together with the Ministry of Communications, to establish correct relationships between the development rate of industry and that of communications facilities for each of the republics. In preparing the project for the perspective plan, we were governed by the necessity to utilize to a maximum the standby communications facilities.

It is planned to increase the multiplexing of circuits. We will continue to introduce the system of direct telegraph connections. It is planned to cover with television broadcasts approximately 92% of the Belorussian territory.

We are now working to establish in Oblast centers a 3-program broadcasting. It is necessary to develop the circuitry of the multiprogram broadcasting apparatus, which will make it possible for us to start its production by the enterprises of the radio engineering industry.

A considerable part of communications workers of Belorussia need living quarters. In the projected perspective plan there is a provision to appropriate more than 85 million rubles for residential construction.



It is necessary to strengthen the scientific-research work of the institutes by attracting an additional number of qualified engineers from the operating communications enterprises. It is necessary, with the existing laboratory as a basis, to establish in Minsk an affiliate of the scientific-research institute.

We are waiting for the Ministry of Communications to help us construct the radio-relay lines and provide the necessary equipment for multiplexing, said the Minister of Communications of the Armenian SSR, T.S. Minasyants. The rate of growth of the GTS, planned for us by the Ministry of Communications USSR, is inadequate and is out of line with the stormy growth of Erevan and other large Armenian cities.

In the opinion of comrade Minasyants, it is a fundamental error on part of the ministry, that all new engineering products are tested and used predominantly in the central part of the Soviet Union; it should also be done in the republics of the Transcaucasus.

The Minister of Communications of the Georgian SSR, G.A. Khristesashvili, said that our industry must produce on a mass-scale typical mechanized facilities for sorting, processing and transporting postal parcels and inexpensive

reliable automated vending machines for selling envelopes, postal cards, stamps and newspapers. It is also necessary to organize the production of special autos designed for use in postal routes, including postal-passenger buses for use on certain routes, where the volume of postal deliveries is small. All of these postal service facilities should be produced by specialized enterprises.

Means should be found to solve the problem connected with the transfer of all radiofication facilities of the kolkhozes to the balance-sheet of organs of communications.

The Minister of Communications of the Tadzhikskaya SSR V.A. Sayko, spoke on the necessity allocate materials for telephone and radio installations by using first the funds of the republics and to obtain these funds in time.

After the creation of republic ministries, stated the Minister of Communications of the Kirgiz SSR, A.G. Toropin, the local management began to pay more attention to improving communications performance. There are reasons to expect that the necessary facilities will be provided to the communications organs. We are worried about materials and equipment: our projects may remain on paper, if the industry will supply us in the same manner as in the past.

The Ministry of Communications USSR should pay more attention to the activities of communications organs of individual republics of the Soviet Union.

"I spent ten years in Kirgiziya", said comrade Toropin, "but none of the managers of the Soviet Union Ministry ever paid us a visit".

The assistant Minister of Communications of the Turkmen SSR, V.G. Krapotukhin, told about the experience of the republic's communications workers in producing poles of reenforced concrete and adapters. He reported that they had developed a new design for poles with strong fittings. In the coming years, the production of reenforced concrete poles and adapters will be expanded.

The Minister of Communications of the Azerbaydzhan-SSR, T.K. Guseynov, stated that GSPI and GIPROSVYAZ take too much time in preparing the projected data for radio-relay lines and other objects, which obstructs the execution of the planned construction.

The deputy chief of TsNIIS, M.I. Gladkiy, supplied interesting data for each of the republics on the rate of development of the country-wide communications facilities, on costs and to what extent are the basic production funds

used, on the relationship between the level of labor productivity, cost of communications service and profitability of communications enterprises, etc. These data can be used in preparing and substantiating a plan for further development of communications facilities in each of the republics.

The chief of TsNIIS, B.F. Anosovich, spoke about the new engineering developments carried out by the Institute. He said that the fate of the developments and the introduction of the new engineering is now being decided at the industrial enterprises which are subordinate to the Sovnar-khozes. For this reason, the Ministry of Communications of the Soviet Union and the scientific-research institutes should establish a business-like contact with the Sovnar-khozes and try to obtain the production of the new equipment in time.

In several republics, for example in Kazakhstan Belorussia, etc., it is expedient to organize laboratories for each form of communications with a staff taken from the operating personnel, so that these laboratories can serve in the future as a base for establishing either a scientific-research institute or an affiliate of the institutes.

The deputy chief of NII of the Ministry of Communications USSR, L.A. Kopytin, acquainted the participants of

the conference with the work of the institute in the field of radio engineering.

FROM THE SPEECH BY THE MINISTER OF  
COMMUNICATIONS USSR, H.D. PSURTSEV.

In summarizing the results of the conference, comrade Psurtsev remarked that the participants discussed actively the basic problems pertaining to the further development of communications facilities in our country and accepted the recommendations for preparing the 1959-1965 perspective plan.

Next, the Minister touched upon the questions raised during the work of the conference.

He told first about certain conclusions arrived at by the experience of the communications organs working with the new structure. The reorganization of the administrative system of the communications organs and the creation of republic ministries of communications, which were carried out in 1955, produced good results.

The Council of Ministers of the Union Republics is responsible for the condition of the communications organs of the republic, are more interested in their activities and furnish them more help. This serves to increase the

inflow of resources for developing the communications, as proven by the example shown by the Russian Federation, Armenian, Azerbaydzhan, Lithuanian and Tadzhik SSR.

Regretfully, however, in certain republics (Latvian, Estonian and others) the reorganisation of the administrative system of communications organs did not result in an inflow of means for developing the communications.

Along with the favorable consequences of the reorganization there are observed also certain unfavorable results. Cases of undisciplined action of individual responsible workers became more frequent; these workers make attempts to justify their conduct as due to the new conditions and try to protect themselves with the authority vested in the republic organizations. For example, despite the repeated instruction of the Ministry of Communications USSR and the decision of the Collegium of the Ministry on the necessity of constructing both television centers and uhf-fm stations, the Ministry of Communications RSFSR, as a rule, is excluding the facilities planned for the uhf-fm stations out of the budget for the construction of television centers.

Identical examples can be cited for other republics.

Also intolerable is putting local interests above the interests of the State as a whole. In May of last year, the Ministry of Communications of the Uzbekskaya SSR was several times instructed to dispatch immediately two cars from Tashkent to Minsk in order to complete the postal line Minsk-Dnepropetrovsk. However, the Ministry of Communications of this Republic refused, without any reason, to comply with these instructions. The same Ministry, contrary to the interests of the main telephone-telegraph line, used the LTU for performing other tasks, so that the necessary work on the main line could not be carried out in due time. Such manifestations of true "localism" cannot be tolerated, especially by communications workers.

It is time for the apparatus of the Republic's ministries of communications to understand that the All-Union interests must be attended first. The instruction issued by the Ministry of Communications USSR on changes in the schedules of communications activities, furnishing communications channels, changes in the postal routes, etc., must be complied with immediately.

The administration of certain republic ministries of communications are trying, as before, to solve all problems only through the Ministry of Communications USSR. It shows

that they did not, as yet, establish the necessary contacts with the organizations of the republics, whose rights, as everybody knows, have been expanded considerably.

On the subject of the technical policy to be adopted for the development of communications facilities, comrade Psurtsev stated that the policy is well defined and was approved during the discussions in the sections of the conference. He, therefore, limited himself with making a few remarks which are of importance to the recommendations adopted by the sections of the conference.

He said that, presently, among the engineering and technical personnel there can be observed adherents of two opposing points of view concerning the type of the newly constructed communications lines-- "radio-relay men" and "coaxial men". It seems to me, he said, that the fight between them is a fruitless waste of time and energy. We are planning to construct for the most important routes lines of three types: radio-relay lines of the type "Vesna", or coaxial cables, or cables of the light-weight type with a small number of quads and radio-relay lines. The choice of the type of the line, which is to be constructed for a given route, depends on the number of channels required and on the cost of works.



During the coming 7-year period we will have the opportunity to obtain large quantities of cable; therefore, it will be possible, even for Oblast-wide and Rayon-wide communications, to use light-weight cables without metallic sheathing and to construct low-channel radio-relay lines.

In the field of radio broadcasting, we do not intend to discontinue the construction of long- and medium-wave stations. But, in the near future, radio broadcasting in the thickly populated regions of the country must employ ultrashort waves; those of the comrades who underestimate ultrashort wave broadcasting are committing a grave error.

The course to be taken for the postal service is the maximum use of aviation, including autogiros and also auto transportation. During the seven years, it is necessary to replace the kolkhos mailmen by those belonging to postal departments, or by mobile postal branches.

Next, the Minister stated that it is planned for the coming 7-year period to increase considerably the industrial production of equipment and materials to satisfy the requirements of communications organs.

In preparing the perspective plan it is necessary to analyse thoroughly the results of the preceding 7-year

period and anticipate correctly the growing volume of communications service. The amount of capital investments and the planned size of the staff in 1959-1965 will depend directly on the planned volume of production of communications which, as a whole, is planned to increase by approximately 70%.

In conclusion, the Minister of Communications touched upon other questions raised during the conference. He pointed out the defects in the practice of planning and organization of supplies and told about the order of preparing and protecting the plans and about the distribution of the funds in the republics.

Comrade Psurtsev also reported that the Ministry of Communications USSR with the participation of the State Committee on Labor and Wages have developed a project containing the basic directions to be taken in arranging the wages of communications workers. But these questions must be reviewed and decided by the government.

For further development of the scientific-research work in the field of communications it is planned to organize in the future scientific-research institutes in Middle Asia and Trans-Caucasus, which will take up problems connected with the development of communications facilities in

these republics. It is planned to establish an affiliate scientific-research institute in Novosibirsk. Considerable attention should be given to the production laboratories, which can furnish much help to the institutes.

It will be possible to carry out the large work program for further development of communications facilities in 1959-1965 by attracting to this undertaking the local construction organizations. One should not think of creating by communications enterprises of construction organizations, which would handle not only communications works, but also civil construction. It is necessary by all means to strengthen and expand the construction-installation offices of radiofication (SMUR) which, as proven by experience, are fulfilling large and important tasks.

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## Communications Engineering

### THE PULSE METHOD OF DETERMINING THE LOCATION OF NON-PAIRED CONNECTIONS OF CABLE-STRANDS

A description of the pulse method for finding the places of non-paired connections in cable wires; a review of the theoretical bases, testing equipment and results obtained by using this method on the city telephone station /GTS/ cables. It points out that this method can be used to find the location of other forms of damages.

#### INTRODUCTION

In many cables of city telephone networks one can find not a few so-called wrongly-connected wires or wires not connected in pairs. For example, in the cables of the Moscow GTS trunk line alone, there are more than 3000 non-connected pairs, which is equal to several percents of the total volume of these cables. In certain cases, wrongly-connected wires are encountered also in many long-distance cables.

Even in the range of audio frequencies, the crosstalk attenuation between wrongly-connected pairs is, as a rule, within the limit of 3-5 nep, and, consequently, as far as

the noise level and crosstalk are concerned, such pairs are not up to standard.

In already installed cables, the places of spliced non-paired wires are usually found by using methods based on measuring the direct capacitance between various combinations of wires<sup>1)</sup>. These methods require extremely tedious measurements and, what is most important, they do not provide the necessary accuracy.

These methods make it possible to find the non-paired connection of wires, if the wires of two pairs are wrongly connected in one (Fig.1a) or in two (Fig.1b) cable joints.

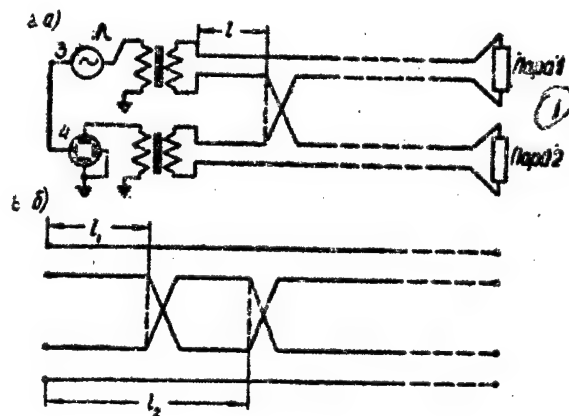


Fig. 1

1) Pair of wires.

1) See, for example, V.N. Kuleshov, v.Z. Malyshev and V.O. Shvartsman, "Electrical measurements of long-distance communications cables", Svyazizdat, M.1953. Pages 127-129

Yet, there are frequent cases of wrongly connected wires of several pairs taking place at once in several places (Fig.2). In such cases, also when the cable insulation was reduced, all methods used until recently will turn out to be unsuitable for finding the places of non-paired connections of wires.

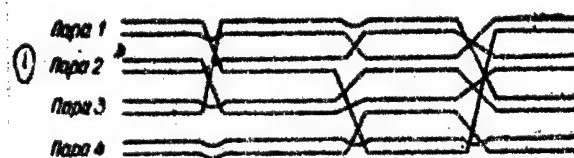


Fig. 2

1) Pairs of wires, (1,2,3,4)

Before giving a description of the newly developed pulse method, we will describe the technique used in finding the pairs which during the splicing have been wrongly connected with each other. The method of detecting such mutually misplaced pairs is based on the comparatively low crosstalk attenuation (3-5 nep) existing between these pairs. After measuring the crosstalk attenuation between each of the cable's circuits and between all other circuits, note is then made of those combinations, in which the crosstalk attenuation is within <sup>the</sup> above limits. If it will turn

out that lowered crosstalk attenuation exists between one of the circuits and several other circuits, it will indicate that the cable has wrongly connected wires of more than two circuits (Fig.2).

Since much time must be spent in measuring the cross-talk attenuation in case of multipair telephone cables, it is recommended to use instead the so-called listening on the telephone. With a certain experience, such method makes it possible to detect quickly all wrongly connected pairs, even in large-capacity cables.

#### THE ESSENCE OF THE PULSE METHOD

To one of the wrongly connected pair (for example, to pair 1) is supplied a short-duration electric pulse from the pulse generator 3 (Fig.1a). Upon spreading over this pair, the pulse reaches the place of the non-paired connected wires, which is characterized by the sharply increased electromagnetic connection between the wrongly connected pairs. At this place occurs the transfer of energy from pair 1 to pair 2.

The beginning of pair 2 is connected to a slave sweep electron oscillograph 4 which is synchronized with the pulse generator 3. The oscillograph serves to determine the time  $2t$  spent by the pulse in passing from the place of

measuring to the place of the non-paired connection and back again. If the velocity  $v$  of propagation of the pulse over the cable is known, it is not difficult to calculate the distance to the place of non-paired connection by using the Formula

$$l = vt$$

If the wires of a cable are wrongly connected in more than one cable joints at the same time, the screen of the oscillograph will show pulses, which will correspond to each place of non-paired spliced wires. At this, the first pulse will correspond to the distance  $l_1 = vt_1$ , the second to  $l_2 = vt_2$ , ect. (Fig.1b).

The oscillograph scale can be preliminarily graduated in terms of distances to the place of non-paired connections of the circuits. For this purpose, in cables of various types the circuits are intentionally damaged at known distances (usually at the end) so as to determine to which of the distances  $S_0$  shown on the scale of the device (in millimeters) will correspond the distance  $l_0$  to the place of damage in the line (in meters). This will make it possible to determine the scale divisions on the device for a cable of the given type  $l_0/S_0$  m/mm. Then, in case of a damage, the pulse which fixes at a distance  $S$  on the scale of the



device the distance to the place of damage is determined from the relationship

$$l = \frac{S}{S_0} l_0 \quad (1)$$

Quantitative characteristics of above process can be obtained, for example, by the method of harmonic analysis<sup>1)</sup>

Let us consider a case of wires wrongly connected twice shown in Fig. 3a. This case would correspond to the distribution of connections between non-paired wires shown in Fig. 3b.

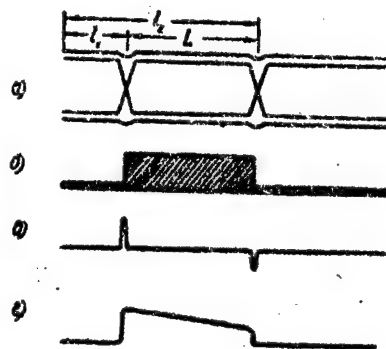


Fig. 3

<sup>1)</sup> See, for example, I.S. Govorovskiy "Radio signals and transient phenomena in radio circuits", Svyazizdat, M. 1954.

The transfer constant of the system, which characterizes the crosstalk at the nearest end is represented by the following Expression

$$G(\omega) = \frac{10kz_0 e^{-2\gamma l_1}}{4\gamma} (1 - e^{-2\gamma L}), \quad (2)$$

where  $k$  is the electromagnetic connection,  $z_0$  is the characteristic impedance,  $\gamma$  is the propagation constant,  $l_1$  is the distance to the nearest place of non-paired wire connection,  $L$  is the distance between the places of non-paired connections of the wires.

In order to obtain more simple and more illustrative results, let us assume that the line is free of distortions, i.e.,

$$\gamma = b + i\frac{c\omega}{v},$$

where  $b$  is the attenuation,  $v$  is the velocity of propagation of energy over the circuit.

Then

$$G(\omega) = \frac{kz_0 v e^{-2bl_1} e^{-2i\frac{\omega}{v} l_1}}{4} (1 - e^{-2bL} e^{-2i\frac{\omega}{v} L}). \quad (3)$$

The spectrum characteristic of the crosstalk at the nearest end acted upon by a single pulse will be determined

by Formula

$$H(\omega) = \frac{kvz_c e^{-2b l_1}}{4} \left( e^{-2i \frac{\omega}{v} l_1} - e^{-2bL} e^{-2i \frac{\omega}{v} l_2} \right), \quad (4)$$

where  $l_2$  is the distance to the second place of non-paired connection of the circuits.

The crosstalk characteristics at the nearest end can be found from the table of Fourier transformations

$$h(t) = \frac{kvz_c e^{-2b l_1}}{4} \left[ \sigma_1 \left( t - \frac{2l_1}{v} \right) - e^{-2bL} \sigma_1 \left( t - \frac{2l_2}{v} \right) \right] \quad (5)$$

where  $\sigma_1$  is the unit pulse,  $t$  is the time.

The pulse characteristic corresponding to Expression (5) is shown in Fig.3c.

In order to obtain a better visible image on the oscillograph screen, it is necessary to use the voltage jump instead of the pulse. In a manner identical to the above it is possible to show that, by using the voltage jump, the crosstalk at the near end is characterized by the Expression

$$h(t) = \frac{kvz_c e^{-2b l_1}}{4} \left[ \sigma_0 \left( t - \frac{2l_1}{v} \right) - e^{-2bL} \sigma_0 \left( t - \frac{2l_2}{v} \right) \right], \quad (6)$$

where  $\epsilon_0$  is the unit jump.

Hence, the pulse characteristic on the screen of the oscillograph will repeat the distribution of the connections in the line (Fig.3d).

In practice, the voltage jump is obtained by using the forward front of a rectangular pulse having a duration larger than the "run-down" time of the pulse from the place of measurement to the end of the circuit and back again.

If the voltage jump is supplied to line possessing amplitude and phase distortions, the images on the oscillograph screen will differ somewhat from those shown in Fig. 3c and 3d by their more rounded shapes of the pulses. As an example, shown in Fig.4 are the pulse characteristics of type MKB cable: the characteristic taken before repairing the defects, which consisted of non-paired connections of the cable circuits at distances of 0.4, 0.8, 1.2 km from the cable's beginning (Fig.4a), and the characteristic taken after the repair of the defects (Fig.4b).

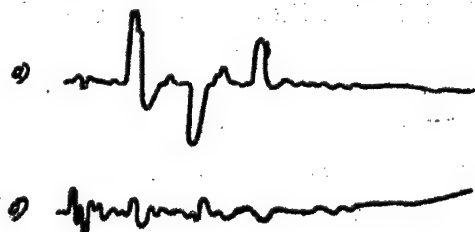


Fig. 4

#### THE APPARATUS EMPLOYED FOR MEASURING

In locating the places of non-paired connected circuits, the measurements can be performed by using the slightly reconstructed type IPS and IPU pulse devices which are employed in measuring the magnitude of discontinuity of circuits of coaxial cables. The purpose of reconstructing the pulse devices is to exclude the differential system and obtain the ability to connect to the individual binding posts the output of the generator of the probing pulses and the input of the amplifier.

The measured circuits are connected to the output of the generator of probing pulses and to the input of the amplifier by means of transformers. For the latter, use can be made of the transformers included in the differential units of the type IPS devices.

The rebuilding must be so made, that the pulse device can be used for both the measuring of discontinuities (with non-separated input and output) and for measuring by the method described above. For example, such a rebuilding was effected in the production laboratory of the office of one of the main cable lines by the engineer N.F. Nekhoroshkov.

Experience shows that the rebuilt type IPU-2k devices

can be used for location of non-paired connected circuits of type TG-0.5 cable in a section of up to 5-6 km long, in a section of up to 9-10 km long for type TG-0.8 cable and in a section of up to 18 km long of a type MKSB cable. The maximum length "examined" with the aid of the rebuilt device IPS-2k is approximately 1 km.

Devices, built with types IPS and IPU as models, provide measurements of great accuracy. These devices, however, are bulky, expensive and in very short supply.

For measurements in the GTS cable networks use can be made of a more simple and comparatively inexpensive small type IIL-1 (IKL-5) pulse device produced by one of the plants of the radio engineering industry. This device makes it possible to separate the input of the amplifier and the output of the generator, which are also equipped with transformers.

#### SOME OF THE RESULTS OBTAINED FROM THE MEASUREMENTS

In order to determine the effectiveness of the pulse method of finding the places of non-paired connection of circuits, a number of measurements have been performed at the Moscow GTS cable network<sup>1)</sup>. The devices employed for the measurements were types IPS-2k, IPU-2k and IIL-1. Some

of the results of these measurements are given in the Table.

1	2	3	4		7
			5	6	
TG-100x2-0.5	1500	IPU-2k	980	1005	2
ditto	1500	ditto	1190	1240	3
"	1500	IPS-2k	30	station manhole	11
TG-200x2-0.5	1090	IPU-2k	225-230	235	3
ditto	1090	ditto	470	480	2
TG-300x2-0.5	3500	IIL-1	640	670	45
TG-800x2-0.5	3760	ditto	410-430	430	3
TG-900x2-0.5	6600	"	385-425	425	3
TG-1000x2-0.5	1900	"	910	940	2
ditto	1900	"	1560	1585	2

1) Type of cable, 2) length of cable in meters, 3) device used for the measurements, 4) distance, in meters, to the place of non-paired connection of the circuits, 5) measured distance, 6) actual distance, 7) number of non-paired wires.

As it follows from the Table, the error in determining the distance to the place of non-paired connection of cir-

1) The following took part in the measurements TsNIIS engineer A.P. Smirnov, Moscow GTS production laboratory engineer V.I. Lavrukhin, and V.I. Novikov, chief engineer of Moscow GTS repair office V.V. Krashevskiy. The measurements were carried out from June 1956 to April 1957.

cuits, as a rule, does not exceed 25-30 m. It should be noted that in measuring in sector, where the length of the cable was known, the error in determining the distance did not exceed 1-15 m. Certain larger errors obtained from the measurement of the line can be explained by inaccurate records.

Nevertheless, the accuracy of measurements shown in the Table should be regarded as adequate, since wires can be wrongly connected only in the cable joints, the distance between which is usually not less than 50-100 m.

#### LOCATING THE PLACES OF OHMIC ASYMMETRY OF THE CIRCUIT AND OF OTHER DAMAGES

The pulse device with separated output of the generator and input of the amplifier can be used also for finding the places of such damages as ohmic asymmetry and lowered crosstalk attenuation (caused, for example, by a punctured balancing capacitor), also to locate the places for the balancing capacitors. For locating the places of ohmic asymmetry, the pulse device must be connected by the diagram as shown in Fig.5, in which case the ground can replace the the second pair of wires (pair 2).

Experiments have shown that with the aid of types IPS



and IPU devices the places of asymmetry of more than 5 ohm can be detected in type MKSB and MKB cables at a distance of up to 10-15 km, and asymmetries of more than 1-2 ohm can be located at a distance of up to 1-2 km. A higher discrimination for this method can be obtained by plotting preliminarily the pulse characteristic when the line is in good order.

By means of the same devices it is possible to determine the place of the cut-in of the capacitor with a capacity of more than 100 micromicrofarad at a distance of 10-15 km and of a capacity of more than 2-5 micromicrofarad at a distance of 1-2 km.

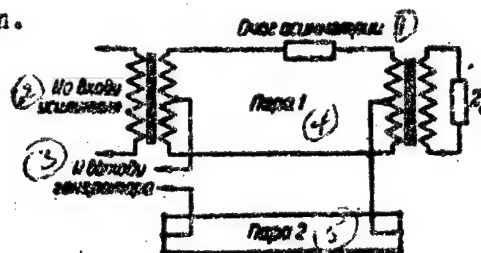


Fig. 5.

- 1) Seat of asymmetry, 2) to input of the amplifier,
- 3) to the output of the generator, 4) pair 1,
- 5) pair 2.

All this confirms the expediency of wide use of the pulse method of measuring in the practice of the city telephone networks.

V.O. Shvartsman, Candidate of Technical Sciences, Senior scientific collaborator of TsNIIS.

INCREASING THE RESISTANCE TO INTERFERENCE BETWEEN  
CIRCUITS OF OVERHEAD TELEPHONE AND TELEGRAPH LINES  
WITH THE AID OF COUNTER-COUPLING NETWORKS

In the following article the author discusses the problem of increasing the resistance to interference between the circuits of overhead telephone and telegraph lines with the aid of counter-coupling networks; the author suggests the possible use of these networks for increased protection between metallic circuits in multiplexing the latter by VS-3 systems.

The method of increasing the resistance to interference between circuits by incorporating counter-coupling networks has found wide application in the balancing technique of interurban cables. An experimental test conducted on an overhead main has shown that this inexpensive, simple and reliable method can be used with equal success on overhead communication lines. This refers in particular to the balancing of circuits with the aid of counter-coupling networks, a method which in many cases establishes the standard of protection between metallic circuits when the latter are multiplexed with a maximum frequency spectrum of 30 kc, and eliminates the laborious operation of rearranging the transpositions.

The principle of this method is as follows.

Fig. 1 shows a schematic illustration of aerial communica-

tion line circuits 1 and 2 where the protection standard is not met. Thus, denoting the minimum resistance to interference in the operating frequency spectrum by  $B_{\min}$ , the equation is written as follows

$$B_{\min} < B_n$$

where  $B_n$  is the protection standard at the far end.

Consider that a counter-coupling network (shown in the same Fig. 1) is connected between the wires of both circuits at distance  $x$  from the beginning of the line for the purpose of increasing the resistance to interference. In that case, the magnitude of the current entering the far end of circuit 2 is determined by expression

$$I_n = U_0 e^{-\gamma_1 x} \frac{1}{2 \left( \frac{Z_{r2}}{2} + R_{cc} + \frac{1}{i\omega C_{cc}} \right)} e^{-\gamma_2 (l-x)},$$

where  $I_0$  is the current at the end of the circuit being affected (circuit 2),  $U_0$  is the voltage at the beginning of the affecting circuit (circuit 1),  $\gamma_1$  is the propagation constant of the affecting circuit,  $\gamma_2$  is the propagation constant of the circuit being affected,  $Z_{r2}$  is the wave impedance of the circuit being affected,  $l$  is the length of the parallel path of the circuits,  $x$  is the distance from the beginning of the line to the connection point of the counter-coupling network, and  $R_{cc}$  and  $C_{cc}$  are the resistance and capacitance of the counter-coupling network, respectively.

\* cc

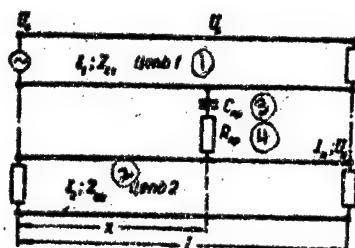


Fig. 1

(Key to Fig. 1)

1) circuit 1; 2) circuit 2; 3)  $C_{cc}$ ; 4)  $R_{cc}$ .

$$\text{Since } Z_{c2} / 2 \ll \left| R_{cc} + 1 / i\omega C_{cc} \right|,$$

then,

$$I_K = \frac{U_0}{2 \left( R_{np} + \frac{1}{i\omega C_{np}} \right)} e^{-\gamma_1 x - \gamma_2 (l-x)} \quad (1)$$

Expression (1) shows that with the parameters of circuits 1 and 2 being different, i.e., when these circuits have a different diameter of conductors, a different distance between them, etc., the phase of the current which enters the end of the circuit being affected depends on the site of the network connection point; thus, the balancing effect is determined by the connection point site.

Should the circuit parameters be identical, i.e., when

$$\gamma_1 = \gamma_2,$$

$$I_K = \frac{U_0 e^{-\gamma l}}{2 \left( R_{np} + \frac{1}{i\omega C_{np}} \right)} \quad (2)$$

it follows that the phase of the current does not depend on the

site of connection of the network.

The preceding discussion leads to a major conclusion: when the resistance to interference is increased between circuits with identical parameters, the counter-coupling network may be connected at the end of the line this procedure being most expedient; in reducing the resistance to interference between circuits with different parameters, the network should be connected in the middle of the section. It is suggested that the preliminary matching of the impedance and capacitance of the network is also possible at the ends of the line.

Besides, it is obvious that of the three kinds of effects exerted on the far end -- direct effect, effect caused by reflection, and effect through third circuits -- the direct effect is most completely balanced by connecting the counter-coupling networks or the effect produced by structural irregularities which, in fact, amounts to the same. The influence of the connection on the effect produced by reflection is somewhat slighter, and least pronounced in reducing the influence of connection is the effect through third circuits inasmuch as the current phase of these kinds of effects have a different dependence on frequency. Thus, the influence is reduced to a minimum between circuits in whose transposition diagrams reiterating peak indices are absent provided that there is a good correspondence between the equipment and the line and a sufficiently high crosstalk attenuation between circuits at the near end.

The connection of a counter-coupling network produces additional effects at the end of the line; in that case, the protection is determined by equation

$$B_{np} = \ln \left| \frac{U_0 e^{-\gamma l}}{U_k} \right| = \ln \left| \frac{U_0 e^{-\gamma l}}{I_k Z_c} \right|$$

\* cc

where  $U_0$  is the voltage at the far end of the circuit being affected.

Value  $I_0$  from Eq. (2) is substituted into the equation above. Then,

$$B_{np} = \ln \left| \frac{2 \left( R_{np} + \frac{1}{j\omega C_{np}} \right)}{Z_c} \right| \quad (3)$$

\* cc

Assuming that both the capacitive and inductive couplings between the circuits are predominant, an expression is obtained which determines the dependence of the capacitance of the counter-coupling network  $C_{cc}$  and the required protection on the effect produced through this network

$$B_{np} = \ln \left| \frac{2 \left( R_{np} + \frac{1}{j\omega C_{np}} \right)}{Z_c} \right| = \ln \frac{2}{\omega C_{np} Z_c} \quad (4)$$

\* cc

The method of increasing the resistance to interference between circuits of overhead lines by means of connecting counter-coupling networks was verified experimentally by A. D. Anasenko and A. A. Kon'kov, scientists of TsNIIS (Central Scientific Research Institute of Communications) on both a model line and an overhead main. The test produced satisfactory results. Occasionally,

the resistance to interference between circuits was increased by 1.5 nepers.

Even better results are achieved by the method of matching elements for the counter-coupling network as described below.

If an increase of 1.5 nepers in the resistance to interference between circuits were desired, the minimum resistance to interference before the matching and connecting the counter-coupling network would be characterized by expression

$$B_{min} > B_n - 1.5 \text{ nepers} \quad (5)$$

In matching a counter-coupling network whose effective current is opposite in phase to the effective current between the circuits within the limits of the parallel path of the circuits, the matching conditions of the elements for the counter-coupling network which raise the resistance to interference between circuits up to the desired standard are determined from expression

$$e^{-B_n} > e^{-B_{min}} e^{-B_{cc}}$$

Obviously, the generalized expression is

$$e^{-B_n} > \sqrt{e^{-2B_{min}} e^{-2B_{cc}}}$$

which does not account for a possible shift of these currents at  $180^\circ$  but a different angle.

In practice, an equality should be reached in both cases

$$B_{min} = B_{cc} \quad (6)$$

For nonferrous metal circuits, the resistance to interference at one section with 20 repeater sections amounts to

$$B_n = 5.8 + 0.5 \ln N = 7.3 \text{ nepers}$$

where N is the number of repeater sections.

In this case, the permissible minimum resistance to interference is

$$B_{\min} = B_n - 1.5 = 7.3 - 1.5 = 5.8 \text{ nepers}$$

For the purpose of balancing the above effect, the counter-coupling network according to Eq. (4) should have a capacitance

$$C_{cc} = \frac{2}{Z_{cc} \omega e^{B_{cc}}}$$

Assuming that  $B_{cc} = B_{\min} = 5.8$  nepers,

$$C_{cc} = \frac{2}{550 \cdot 2\pi \cdot 150 \cdot 10^3 \cdot 330.3} = 12 \cdot 10^{-12} \text{ f}$$

is obtained for a frequency of 150 cps.

This capacitance can be obtained in practice by the use of balancing capacitors which are available in office and line coil loading units. However, the connection of an additional resistance  $R_{cc}$  into the counter-coupling network, as shown in Fig. 1, reduces the effect considerably, improving the equilibrium between the effective and balancing current phases.

The minimum resistance to interference between metallic circuits on four adjacent sections is 4.8 nepers (with the connection of noise suppressors). In a similar case of increased resistance to interference by 1.5 nepers



$$B_{\min} = 4.8 - 1.5 = 3.3 \text{ nepers.}$$

In that case, the capacitance of the counter-coupling network is determined by the expression

$$C_{cc} = \frac{2}{800 \cdot 2\pi \cdot 25 \cdot 10^3 \cdot 27,1} = 0,59 \cdot 10^{-9} \text{ } \phi$$

or

$$C_{np} = 590 \text{ n}\phi.$$

$$C_{cc} = 590 \text{ } \mu\mu\phi.$$

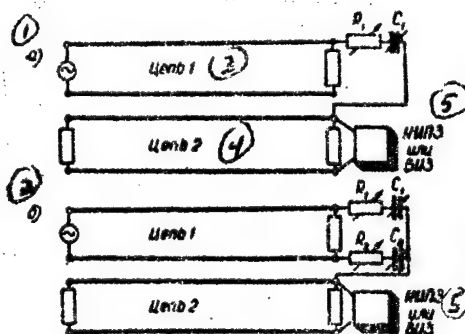


Fig. 2

(Key to Fig. 2)

1) a; 2) b; 3) circuit 1; 4) circuit 2; 5) KIPZ or VIZ

The increase of the resistance to interference between circuits by means of counter-coupling networks is carried out in three stages: the matching of circuit elements, connection of a d-c circuit, and the testing of the achieved resistance to interference between circuits.

The matching of elements for the circuit is accomplished

according to the diagram in Fig. 2a or according to the diagram shown in Fig. 2b which has been suggested by A. A. Kashutin for the balancing of communication cables and is even more suitable. The use of the latter accelerates the process of matching the network elements. Without additional resistances the same diagram is used in office and line coil loading units.

In matching the network elements according to the diagram in Fig. 2a, the network must be assembled from a resistance box  $R_1$  up to 10-100 kohm, a variable capacitor  $C_1$  of 1000  $\mu\text{f}$  for metallic circuits, and that of 100-500  $\mu\text{f}$  for copper circuits. The elements are matched with the minimum current in the KIPZ indicator (Control Meter of Crosstalk Attenuation) or with the best readings obtained in a VIZ (Visual Meter of Crosstalk Attenuation). If the diagram in Fig. 2a fails to show the minimum current, one of the ends of the variable network is disconnected from wire a and connected to wire b. The obtained values  $R_1$  and  $C_1$  will correspond to the counter-coupling network which are connected into the circuit, i.e.,  $R_{cc}$  and  $C_{cc}$ .

The counter-coupling network is symmetrically connected as shown in Fig. 3. If a variable network were connected according to the diagram in Fig. 3a, the balanced network of the d-c network could correspond to Fig. 3b. However, if the a-c network were connected according to Fig. 3c, the diagram of the d-c network would correspond to Fig. 3d. In the networks shown in Figs. 3c and 3d, the resistance

values have to be doubled as compared to the values obtained in the matching, while capacitances -- reduced one half.

The matching of the network elements by means of the diagram shown in Fig. 2b requires two resistance boxes  $R_1$  and  $R_2$  and two  $C_1$  &  $C_2$  capacitors of variable capacitance (of about the same values as in the first case).

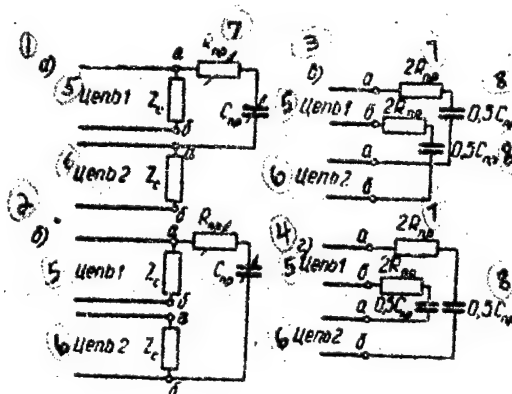


Fig. 3

(Key to Fig. 3)

1) a; 2) b; 3) c; 4) d; 5) circuit 1; 6) circuit 2;  
7)  $R_{cc}$ ; 8)  $C_{cc}$ .

After adapting the proposed method of matching, the two elements -- the resistance box and the capacitor -- may be replaced by fixed elements.

The matching of elements for the counter-coupling network according to the diagram in Fig. 2b requires a preliminary determination of some values for  $R_1$ ,  $R_2$ ,  $C_1$ , and  $C_2$  and the

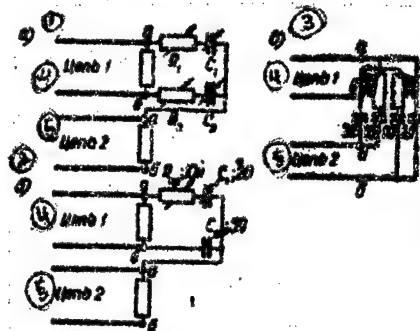


Fig. 4

(Key to Fig. 4)

1) a; 2) b; 3) c; 4) circuit 1; 5) circuit 2.

verification of the possibility of obtaining a minimum current by initially varying the capacitance  $C_1$  followed by altering resistance  $R_1$  or  $R_2$ . After obtaining the current minimum, the value of the conductance of the d-c counter coupling network  $1/R_{cc}$  is determined as the difference between  $1/R_1$  and  $1/R_2$  conductances (deducting the lower conductance from the higher one). The determined capacitances of capacitors  $C_1$  and  $C_2$  may be varied to identical values so as to utilize the fixed capacitors available.

If it were found, for example, that by matching  $R_1 = 5 \text{ kohm}$ ,  $R_2 = 10 \text{ kohm}$ ,  $C_1 = 20 \mu\text{f}$ , and  $C_2 = 50 \mu\text{f}$  (Fig. 4a), an equivalent network may be assembled by the connection of  $R_{cc} = R_1 R_2 / R_2 - R_1 = 10 \text{ kohm}$  and capacitors of any capacitance, however, the capacitance of capacitor  $C_2$  should exceed that of capacitor  $C_1$  by  $50 - 20 = 30 \mu\text{f}$ .

Better results are achieved by using a symmetrical network (Fig. 4c). In this network, the elements which are to be connected into the branch between wires a-a should also be connected into b-b, while the elements which are to be connected between a-b should, in turn, be connected between the other pair of wires b-a. Thus, the capacitances are reduced by one half, and the resistances - doubled.

M. A. Klimov, Candidate of Technical  
Sciences, Deputy Chief  
Technical Division, Main  
Administration of Materials for  
Telephone and Telegraph Offices

## DETERMINING THE ANTENNA POSITION AND

### DIRECTION IN THE LOCALITY

The method used to determine the position and direction of the antenna in the antenna field is described.

In the operating practice of a radio center it is sometimes necessary to construct a new antenna and use for that purpose the workers of the antenna group. The leader of the antenna group has the task of finding the most suitable place in the locality. Ordinarily, the projected antenna is preliminarily plotted on the general drawing of the antenna field of the radio center. Hence, it is necessary to determine in the locality the reference point of the antenna and align through it the azimuthal line corresponding to the direction of the receiving party. Both of these problems are solved with the aid of a theodolite, which should be kept in every radio center (an elementary acquaintance with the theodolite is needed for the solution of these problems).

Bench marks - fifth order triangulation station marks - are embedded at several places in the area of the radio center. Each bench mark is numbered, and the directions from bench mark to bench mark are calculated with an accuracy of fractions of a second; the coordinates of the bench marks are known precisely. Information on the co-

ordinates of the marks and traverses from one to another can be obtained from the journal which is kept with the general drawing of the antenna field.

Before visiting the locality, it is necessary to perform certain calculations. For example, it is necessary to determine the coordinates of the reference point of the antenna. A coordinate grid is plotted on the general drawing of the antenna field from which are found with the aid of a straight-edge (if the scale of the drawing is known) the  $x$  and  $y$  coordinates with their respective signs (+ or -). It is necessary to mention that the  $X$ -axis has a meridional direction. After finding on the general drawing the bench mark nearest (and more conveniently located) to the antenna reference point, its coordinates are copied from the journal and its direction to the next bench mark, i. e., its traverse is also copied.

The distance between two points can be found trigonometrically. From Fig. 1 it is clear that

$$\tan \alpha = \frac{\Delta y}{\Delta x} \quad (1)$$

from which, the distance  $S$  between the two points  $A$  and  $B$  with coordinates,  $x_1, y_1$  and  $x_2$  and  $y_2$  respectively, is equal to

$$S = \frac{\Delta y}{\sin \alpha} = \frac{\Delta x}{\cos \alpha}, \quad (2)$$

Here,  $\Delta x = x_2 - x_1$  and  $\Delta y = y_2 - y_1$ .

The sequence of the operations for the solution of the problem is as follows. Find the difference between the respective coordi-

nates and their ratio from Formula (1); find the angle  $\alpha$  from the trigonometric tables, also the sine (or cosine) value of this angle. Using Formula (2), find the distance between the two points.

The trigonometrical solution of the problem yields two values: the distance between the two points and the direction from one point to another. The direction is determined by angle  $\alpha$  expressed in degrees, minutes and seconds.

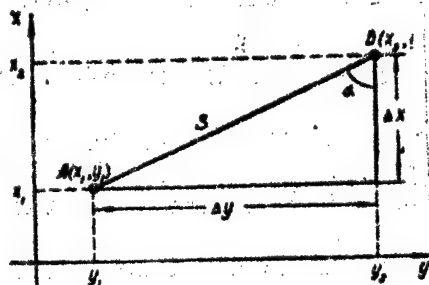


Fig. 1.

It should be noted that  $\alpha$  is the angle between the meridian and the direction from the bench mark to the antenna reference point. Consequently, the ratio or  $\Delta y$  to  $\Delta x$  must be used, not the other way. Since the periodicity of the tangent is equal to  $180^\circ$  and the azimuths of the direction may have values from  $0$  to  $360^\circ$ , therefore to the ratio  $\Delta y / \Delta x$  will correspond the two angles:  $\alpha$  and  $\alpha + 180^\circ$ .

The unknown azimuth:  $\alpha$  or  $\alpha + 180^\circ$  is determined from the mutual location of the bench mark and the reference point in the general drawing.



In practice, such problems are solved with the aid of logarithms. For this, it is desirable to use five-place logarithmic tables (see, for example, Ye. Przhevalskiy "Five-place logarithmic tables". Uchpedgiz, 1938), but, if not available, four-place tables can also be used.

**Example.** Let the location of the bench mark B and reference point A on the general drawing be as shown in Fig. 2. With a rule we find from the coordinate net the coordinates of the antenna reference point A ( $x_2 = +362.805$  m).

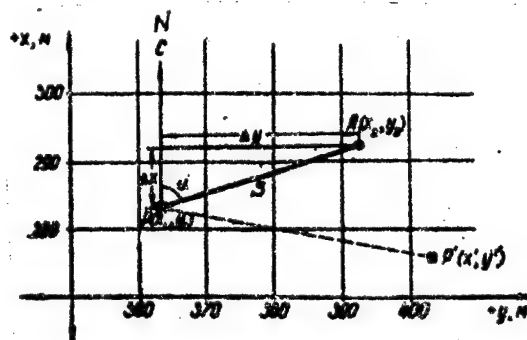


Fig. 2

1. Let us find the differences between the respective coordinates:

$$\Delta x = x_2 - x_1 = 292.0 - 282.824 = 9.176 \text{ m},$$

$$\Delta y = y_2 - y_1 = 392.0 - 362.805 = 29.195 \text{ m}.$$

2. From the ratio of  $\Delta y$  to  $\Delta x$  we determine the tangent of angle  $\alpha$ . However, finding the ratio  $\Delta y/\Delta x$  by division will take much time and may produce errors; hence, by taking logarithms for the Expression, we will get:

$$\log \tan \alpha = \log \Delta y - \log \Delta x = \log 29.195 - \log 9.176 = 0.502655$$

Angle  $\alpha$  we will find from the trigonometric logarithm table:

$$\alpha = 72^{\circ}33'08''.$$

3. From the same trigonometric logarithm table we will find the logarithms for  $\sin \alpha$  and  $\cos \alpha$

$$\log \sin \alpha = \bar{1}.979545; \quad \cos \alpha = \bar{1}.476890$$

4. We will find the distance  $S$  from the datum mark  $R$  to the antenna reference point  $A$  from Formula (2). Taking logarithms, we get:

$$\log S = \log \Delta y - \log \sin \alpha = 1.485760$$

Taking antilogarithms for the value of  $\log S = 1.485760$ , we find that  $S = 30.603$  m.

To check the correctness of the calculations, we will find  $S$  by using  $\Delta x$  and  $\cos \alpha$ :

$$\log S = \log \Delta x - \log \cos \alpha = 1.485760.$$

By taking antilogarithms, we also get  $S = 30.603$  m, which confirms the correctness of the calculations.

The angle  $\alpha$  found between the direction to the North  $N$  and the direction to the antenna reference point  $A$ , represents the azimuth of point  $A$  (Fig. 2).

Consequently, by setting up on the ground the theodolite at the bench mark  $R$ , pointing the telescope of the theodolite exactly to the north and then rotating the telescope clockwise through an angle  $\alpha =$

$=72^{\circ}33'08''$  and laying off along this direction the distance from point R, or S - 30.603 m, we will find the exact location of the antenna reference point A.

In practice, there is no necessity of pointing the telescope exactly towards north. It is done in a simpler manner: the azimuth of the next bench mark is set on the scale of the horizontal circle and the telescope is pointed towards this bench mark, i. e., after the horizontal circle is oriented exactly in all four directions; then, set on the horizontal circle scale the required azimuth, and obtain in this manner the direction of the telescope towards the antenna reference point A.

Let us use the above example to illustrate what was said above. Let the direction (azimuth) from bench mark R to bench mark R' (Fig. 2) be equal to  $102^{\circ}56'03''$ . Let us point the theodolite towards bench mark R. Rotating the alidade we set the pointer on the  $102^{\circ}56'03''$  division of the horizontal circle scale. Thereafter, we will set the telescope (by turning it together with the horizontal circle) towards R' and we clamp this position. It is perfectly obvious that by setting the pointer on  $270^{\circ}$ , the telescope will point exactly to the West; by setting the pointer on  $0^{\circ}$ , the telescope will point exactly to the North, etc. But we want the direction towards the antenna reference point A. To obtain it we set the pointer to  $\alpha = 72^{\circ}33'08''$  and the telescope will then occupy the required position. In this direction we will use a measuring tape to lay off from the bench mark

R the distance  $S = 30.603$  m, and we will thus find in the locality the reference point of the antenna.

The determination of the antenna reference point involves the performance of several calculations which may contain errors and, besides, the setting of the theodolite at the locality may be accidentally disturbed without the surveyor's knowledge. It is, therefore, necessary to check the correctness of the location of point A.

The checking is done in the following manner. The theodolite is pointed towards the antenna reference point A (Fig. 2) and is accurately oriented in all four directions. It is obvious that with an azimuth from point R to point A equal to  $\alpha$ , the azimuth from point A to point R will vary by  $180^\circ$ , i. e. it will be equal to  $\alpha \pm 180^\circ$ . A simple rule is used to determine the sign in front of the  $180^\circ$ , namely, if  $\alpha$  is less than  $180^\circ$ , the new azimuth is  $\alpha + 180^\circ$  and if  $\alpha$  is greater than  $180^\circ$ , then the azimuth is  $\alpha - 180^\circ$ . Since in the above example  $\alpha = 72^\circ 33' 08''$ , therefore,  $180^\circ$  must be added to this value. Consequently, the azimuth from point A to point R will be equal to  $\alpha + 180^\circ = 252^\circ 33' 08''$ . Upon setting this angle on the horizontal circle, the telescope is turned towards the bench mark R, orienting in this manner the horizontal circle exactly in all four directions.

After fixing the position of the horizontal circle with the clamp, the telescope is pointed (by turning only the alidade) towards the adjacent bench mark R' and the readings on the horizontal circle

will indicate the azimuth of the bench mark  $R'$  with respect to point A. The next step is to measure with the measuring tape the distance between point A and bench mark  $R'$ . In this manner we get two values:  $\alpha'$  and  $S'$ . Assuming that the coordinates of point A,  $\alpha'$  and  $S'$  are known, it is then necessary to determine the coordinates of bench mark  $R'$ , to solve the problem in reverse order given in the example. If the calculated coordinates of  $R'$  coincide with those recorded in the journal, it will indicate that the reference point A has been determined correctly.

To solve the inverse problem (the solution is simpler than for the direct), let us find from the table of logarithms the values of  $\log S'$ ,  $\log \sin \alpha'$ ,  $\log \cos \alpha'$ . Taking into consideration that

$$S' = \frac{\Delta y'}{\sin \alpha'} = \frac{x'}{\cos \alpha'},$$

we get the values

$$\Delta y' = S' \sin \alpha' \quad \text{and} \quad \Delta x' = S' \cos \alpha'$$

or, by taking logarithms:

$$\left. \begin{aligned} \log \Delta y' &= \log S' + \log \sin \alpha' \\ \log \Delta x' &= \log S' + \log \cos \alpha' \end{aligned} \right\} \quad (3)$$

Having found the values of  $\Delta y'$  and  $\Delta x'$ , i. e., the differences between the respective coordinates of points A and  $R'$ , let us determine the coordinates  $x'$  and  $y'$

$$x' = x_2 + \Delta x' \quad \text{and} \quad y' = y_2 + \Delta y',$$

which must be equal to the coordinates of bench mark  $R'$ .

If the correctness of locating the reference point is confirmed by checking, it is then possible, without moving the theodolite from its place (the antenna reference point), to align an azimuthal line along the direction to the correspondent station. For this, the pointer is set on the division of the horizontal circle which corresponds to the azimuth of the correspondent station. In this case, the telescope will turn out to be directed exactly towards the correspondent station and, what remains to be done, is to drive-in pegs in the ground along this direction.

It may happen that the adjacent bench mark is not accessible to the antenna reference point due to some obstruction (building, hill, etc), or the distance between them is large. In this case, the theodolite is moved between the bench mark and the unknown point until an intermediate point is found which can be seen well from both the bench mark and the area where the antenna reference point is to be located. The azimuth of the intermediate point is found from the bench mark and, by solving the inverse problem by using Formula (3); its coordinates are determined. The direct problem in relation to the intermediate point and the unknown antenna reference point is solved by using Formulas (1) and (2).

It may happen that the bench mark is so remotely located that one intermediate point is inadequate. In such cases, several intermediate points are used and their coordinates found successively; the

direct problem is used for the solution between the last intermediate point and the unknown reference point of the antenna. It is necessary to take into account the fact that with each successive intermediate point errors may accumulate during the determinations of the angles. The allowable error  $f$ , in minutes, is determined from the following Formula

$$f = \pm 1.5a \sqrt{n}, \quad (4)$$

where  $a$  is the order of precision of the theodolite in minutes,  $n$  is the number of points occupied by the theodolite.

Thus, if the theodolite's order of precision is equal to one minute, the allowable error for this theodolite is found from the Formula

$$f = \pm 1.5 \cdot 1' \sqrt{n} \text{ minutes.}$$

If, after checking the location of the antenna reference point, the error in determining the coordinates of the reference bench mark  $R'$  is within the limits of Formula (4), it can be then considered that the reference point of the antenna has been located correctly.

G. I. Druz', Engineer.

## VOICE-FREQUENCY MANIPULATOR WITH FREQUENCY MANIPULATION

Here is a description of the frequency manipulation of a low-frequency oscillator without a reactance tube. Such method can be used for the development of new equipment in the communications production laboratories.

The oscillation frequency of an oscillator is ordinarily manipulated with the aid of a reactance tube. At low oscillation frequencies (2 to 10 kcps) of the oscillator, however, this method is unsuitable for obtaining an adequately large frequency deviation for the oscillator.

The author of this article submitted in 1956 a proposal for a new method of frequency manipulation of a low-frequency oscillator. The keyer tube, which serves as the controlled double diode, is connected in series with the additional capacitor  $C_{dop}$  of the oscillating circuit of the oscillator (Fig.1a). Upon supplying a negative voltage to the grid of the keyer tube, the latter is blocked and the capacitor  $C_{dop}$  will become connected to the capacitor  $C_k$  of the oscillating circuit of the oscillator through a large resistance  $R$ . Consequently,  $C_{dop}$  is almost without effect, inasmuch as the oscillation frequency is concerned, which



in this case is determined by the magnitudes of the inductance and capacitance  $C_k$ .

Upon supplying a positive voltage to the grid of the keyer tube, the latter will become unblocked and the additional capacitor  $C_{dop}$  will become connected in parallel to the capacitor  $C_k$  through the internal resistance of the keyer tube, whose magnitude is not large (of the order of 500 ohm). Consequently, in this case, the oscillation frequency of the oscillator will vary and will be determined by the total capacitance of  $C_k$  and  $C_{dop}$ .

The resistance  $R$  serves to supply the constant voltage input pulses to the cathode of the right triode of the tube.

Fig.1b shows a balanced connection of the additional capacitances  $C_{1 dop}$  and  $C_{2 dop}$  to the oscillator circuit with the aid of the keyertube. This method has certain advantages over the one above, since as, here, the keying has no effect on the transient processes in the circuit.

Shown in Fig.2 is a circuit-diagram of a voice-frequency manipulator using this method of keying. Here, the triode  $L_1$  is the input amplifier of the keying pulses (UPT); its purpose is to calibrate the input pulses.  $L_2$  is the keyer tube and is connected by the "controlled double diode"

method. The triode  $L_3$  is a low-frequency oscillator; the oscillator is assembled in the diagram with the tank in the grid circuit (choke-coil with the mid-point  $D_r$  and capacitor  $C_1$ ). The magnitude of the feedback is chosen with the aid of the variable resistance  $R_3$ .

The tube  $L_4$  is the output amplifier of low frequency, which provides an output of 600 ohms with a level of up to 2.5-3.0 nep. The level is regulated by the potentiometer  $R_4$ , which is connected to the output winding of the oscillator's transformer.

The voice-frequency manipulator is supplied with power from a conventional 250 v rectifier. In order to improve the level and frequency stability, the voltage to the oscillator ( $L_3$ ) and the UPT ( $L_1$ ) is controlled with the aid of the CG4S gas stabilizer tube.

When the UPT tube is blocked (by the input signal) and the plate current is not passing through it, the grids of the keyer tube  $L_2$  will be connected to a point having a voltage of +150 v; depending on the position of the potentiometer's  $R_1$  slider, the voltage of the cathodes of this tube will be less than 150 v. Consequently, in this case, the grids of  $L_2$  have a positive charge with respect to the cathodes.

When the UPT is unblocked, an additional voltage will appear in the  $L_2$  grid circuit due to the voltage drop across  $R_2$  caused by the plate current of  $L_1$ . If this voltage drop is larger than the voltage tapped from the potentiometer  $R_1$ , the grids of the  $L_2$  tube will have a negative charge with respect to the cathodes.

The magnitude of the internal resistance and, consequently the oscillator's frequency depend substantially on the voltage across the grids of the keyer tube. Fig.3 shows the dependence of the oscillator's frequency (the oscillator assembled as in Fig.2) on the voltage across the grids of the keyer tube (at point a-b) at different values of the capacitance of the tank. By changing the position of the slider of potentiometer  $R_1$  (with the triode  $L_1$  blocked) it is possible to obtain the required frequency value of the "release"; then, by regulating the potentiometer  $R_2$  (with the  $L_1$  triode unblocked) it is possible to set the required value for the frequency of "press down".

A manipulator of this type makes it possible to obtain an operating frequency separation of up to 500 to 600 cps.

Its sensitivity (depending on the UPT input) is about  $\pm 15$  v. The "run-out" of frequency after the oscillator is

connected does not exceed 0.5%; the frequency stability, when the supply voltage changes by +5%, -15%, is equal to 1%.

In certain cases the frequencies of "release" and "press down" at the output of the manipulator may have somewhat different amplitudes, which is unimportant and can be eliminated by correcting the frequency characteristic of the output low-frequency amplifier.

The transformers are made of Sh-12X14 (type M-42) transformer steel; the cores are assembled without air gaps. The data on the  $Tr_1$  windings are: the windings I and II each have 1000 to 1500 turns of PE-0.1 wire, the winding III has 150 to 200 turns of the same wire. For  $Tr_2$ : the I winding has 1000 turns of PE-0.15 wire, winding II has 350 turns of PE-0.1 wire.

The choke coil Dr is wound on a form with two sections, the lead-out is made from the point of connection; the wire is PE-0.3-0.4. The core of the choke (Sh-12X14) has no gap and is assembled of permalloy.

The special feature of the method is that the oscillator must operate at small values of the capacitance of the oscillatory tank (approximately 1-2 thousandths of micro-micro farads). In this case, the distributed capacitance of

the choke's winding has a substantial effect on the oscillator's frequency. Therefore, the number of turns for the choke coil must be selected experimentally for the given frequencies of the tank and selected capacitances ( $C_1$ ,  $C_2$  and  $C_3$ ).

The following approximate values can be mentioned for the inductances and capacitances of the oscillator circuit: for operation with frequencies of about 4-5 keps, the inductance of  $L_r$  is about 0.9 to 1.2 henry, of  $C_1$  is 800 to 1500  $\mu\text{Mf}$ , of  $C_2 = C_3 = 1000$  to 1500  $\mu\text{Mf}$ ; for operation with frequencies of 2 to 2.5 keps, the inductance is about 2.5 to 2.8 henry,  $C_1 = 100$  to 1500  $\mu\text{Mf}$ ,  $C_2 = C_3 = 2000$  to 4000  $\mu\text{Mf}$ . The normal operation of the oscillator can become disturbed if the capacitance of  $C_1$  is smaller and the capacitances of  $C_2$  and  $C_3$  is larger than shown above.

The examination of the curves of Fig.3 shows that an increased capacitance of  $C_1$ , while those of  $C_2$  and  $C_3$  remain unchanged, will lead to reduce the oscillator frequency and a lower deviation; increased  $C_2$ ,  $C_3$  capacitances with  $C_1$  remaining unchanged will result in a larger deviation. This can serve as a guide when adjusting the oscillator (by selecting the required inductance value of the choke). The operating conditions of the oscillator depends on the

value set for the feedback (with the aid of resistance  $R_3$ ). The criterion indicating the correct selection of the feedback is the absence of substantial distortions of the shape of the oscillator's oscillations for the chosen operating conditions (this is determined with the oscillograph during the manipulation).

The operating frequencies of the oscillator also depend to a small degree on the magnitude of the feedback. This, however, is of small importance, since at the initial adjustment of the oscillator, the frequencies of "release" and "press down" can be corrected by the potentiometers  $R_1$  and  $R_2$ .

If a manipulator with a low-ohm output is desired, one of the triodes of the tube  $L_4$  can be used as a resistor-coupled amplifier, and the other as a cathode follower (with corresponding changes in the data of the output transformer).

Since the electrodes of the keyer tube  $L_2$  of the described circuit are not connected, galvanically, with the circuits of the oscillator and low-frequency amplifier, therefore, the UPT tubes ( $L_1$ ) and potentiometer  $R_1$  can be supplied with voltage from an independent 50 to 250 v source. This makes it possible to add to the circuit of

the manipulator (Fig.2) another one-two UPT cascades (or to connect the tubes  $L_2$ - $L_4$  to the output of the preceding device) without using a separate supply of power, but using methods for amplifying the direct current with plate voltage dividers. This fact represents a definite convenience in using this method of frequency manipulation.

A.F. Shuvalov, Engineer of radio communications laboratory of MDRSV.

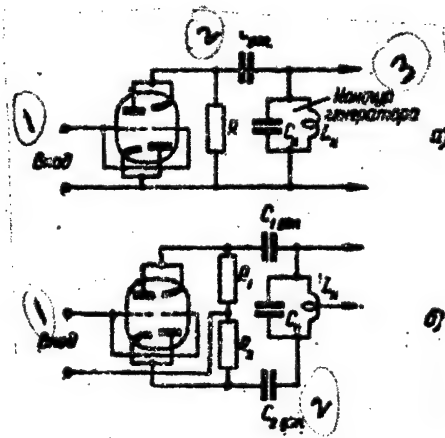


Fig. 1

1) Input, 2)  $C_{доп}$ , 3) oscillator circuit.

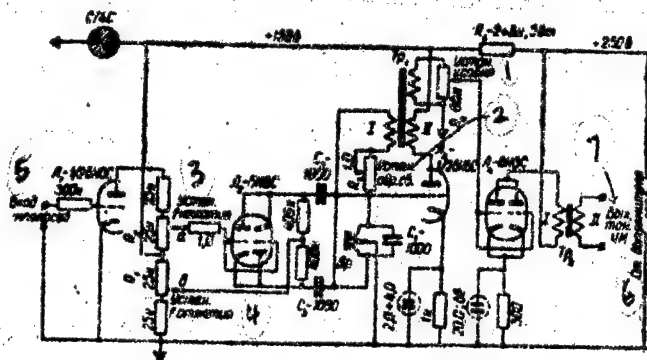
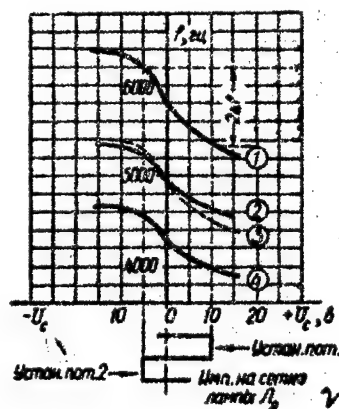


Fig. 2

- 1) Setting the level, 2) setting the feedback, 3) setting the "release" 4) setting the "press down"
- 5) input, 6) from the rectifier. 7) output tonal FM



- ①  $C_1 = 1000 \text{ nF}; C_2 = 1000 \text{ nF};$
- ②  $C_1 = 1500 \text{ nF}; C_2 = 1000 \text{ nF};$
- ③  $C_1 = 1500 \text{ nF}; C_2 = 1020 \text{ nF};$
- ④  $C_1 = 1500 \text{ nF}; C_2 = 1020 \text{ nF};$

Fig. 3

- 1) Setting the potential 1, 2, 2) pulses on the grid of tube  $L_2$ , 3) capacitances in micromicro farads.



17

**THE MOSCOW ELECTROTECHNICAL COMMUNICATIONS INSTITUTE  
ANNOUNCES THE ACCEPTANCE OF APPLICATIONS FOR THE 1958  
POST-GRADUATE COURSES IN THE FOLLOWING SPECIAL SUBJECTS:**

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theory of electrical communications; telegraphy; telephony;  
theoretical electrical engineering; communications econo-  
mics; organization and operation of electrical communicat-  
ions.

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tute from 1 May to 1 September, together with the following  
documents: notarized copy of the diploma showing the comp-  
letion of a higher educational institute and excerpts from  
the school certificate; references from the last place of  
employment; autobiography; personal list of qualifications  
with a photo; published scientific works, information on  
inventions, experimental and designing work and opinions.

of others on the value of these works; in the absence of such, a thesis to be written on a subject selected by the candidate; document showing the performance in practical work (abstract from the labor book certified in place of work); information on health proving the ability to go through the post-graduate course. Entrance examinations on the special discipline, history of the CPSU and a foreign language equivalent to the program taught in a technical higher educational institute will be held from September 10 to September 30, 1958. Accepted candidates, who will give up their production jobs, will be provided with dormitory living quarters.

For information apply to: Moskva, Aviomotornaya Ul., House 8-a; tel. Zh 4-37-45.

## Organization and Operation of Communications Facilities

### EXAMPLARY SERVICE WITH COMMUNICATIONS FACILITIES FOR THE ELECTIONS TO THE SUPREME SOVIET USSR

16 March 1958 is the next election day to the Supreme Council USSR. During this period of preparation and carrying out this most important political campaign, the communications workers must use their facilities to give punctual and uninterrupted service to the central, district and section commissions. Special attention should be given to the service of Party and Soviet organs with communications facilities, radio broadcasts, television and radio installations. Communications organs must also provide immediate transmission of materials on the arrival of voters and information on the results of voting.

The Minister of Communications USSR, N.D. Psurtsev, had issued an order outlining the measures to be taken to furnish communications service for the election to the Supreme Soviet USSR. The Ministers of Communications of the Soviet Republics, the administration of offices and enterprises have been instructed to prepare the measures necessary for the organization of communications between the Central and district election commissions, and between

the section and district election commissions for the elections to the Council of the Soviet Union and to the Council of Nationalities.

It will be necessary to increase the power of the electrical communications, which will service the elections, and to improve their technical conditions. Those places, which are to be "telephonized" during the 1st quarter of this year in accordance with the plan, such as MTS, rural Soviets, kolkhozes and sovkhoses, must "telephonize" first the election districts.

All material and technical facilities must be mobilized to provide telephone and radio service to the election districts. Wherever necessary, and by agreement with the local Soviet labor deputies, telephones and radio points will have to be moved to the locations of the election commissions.

All methods and schedules of mail deliveries should be reviewed in order to avoid delays in the delivery of correspondence and parcels connected with the elections in the Republics, Krays and Oblasts. Special attention should be given to provide punctual postal service for the election sections which have no electrical communications with the election districts.

An unlimited acceptance of parcels with materials on the elections (weighing up to 16 kg) has been introduced for the period of the election campaign. A special mark-- "election"-- has been established for postal mail and parcels containing material on the elections. The acceptance, processing, transportation and delivery of such mail is to be effected immediately.

Telegrams marked "election" and orders for long-distance telephone conversations (at the regular rates) are to be also serviced immediately.

It is necessary to effect in time the checking and tuning of the telephone facilities of the district election centers and their communications with the Oblast (Kray, Republic) centers and obtain a good audibility for the communications with Moscow. During the period from 1 to 10 March, the telephone and telegraph communications must be tested in accordance with the manner they will operate on election day and on the day of announcing the results of the elections. It is also necessary to strengthen the operating and technical service of the telephone-telegraph lines, especially in the districts subject to bad ice conditions, freezing and inundation by river floods.

It is extremely important to provide uninterrupted operations<sup>n</sup> for the radio-relay stations and the Rayon-wide communications between the election sections and the Rayon centers. It is necessary to check the audibility of the telephone circuits and make it possible for the VRS clients (especially for the election commissions) to obtain an outlet to the long-distance telephone network for communications with the Republic, Kray and Oblast centers. Radio facilities will be necessary to install in the buildings of the election commissions and campaign headquarters in the cities and Rayon centers; a maximum of radio facilities must be provided for the election sections in the villages; provision should be made for the amplification of the speeches by the orators at the meetings and pre-election conferences.

It is necessary to check the technical conditions of radio communications, radio broadcasting and television enterprises and effect a preventive examination and testing of the entire operating and standby equipment. In case of necessity, it is recommended to attract the operating radio stations of other departments, which are located in the territory of the Oblast, Kray and Republic. From 1 March, there will be established an enlarged schedule for the main and Oblast-wide radio service, which takes into account the

necessity to provide radio communications between the election commissions of the sections and those of the districts, and between the district commissions and the Central election commission.

It is proposed to install telephones in the buildings of the section and district election commissions. A special inspection is introduced to check the condition of the line installations which serve the election sections. Special signals are provided on the switchboards for the telephones of the election commissions.

There will be a wide distribution of literature and posters published for the elections to the Supreme Council USSR. The processing and delivery of this literature, posters and portraits will be effected within 24 hours from the time they are received.

It is planned to provide the communications enterprises with operating materials necessary to service the elections and assure an immediate delivery of these.

An operating group under the leadership of the Assistant Minister of Communications USSR, I.V. Klovov, has been created to manage the entire work for the organization and to provide communications facilities to the election commissions during the period of preparation and carrying out

of the elections to the Supreme Soviet USSR. The Ministers of Communications of the Soviet Republics, the chiefs of the offices and communications enterprises will be personally responsible for the organization and servicing the election campaign with communications facilities.

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THE APPEAL OF THE MOSCOW TELEGRAPH OPERATORS  
TO ALL COMMUNICATIONS WORKERS

In 1957, the collective of workers of the Central Telegraph USSR was frequently among the winners of the All-Union socialist competition between the communications workers.

In the endeavor to commemorate in a deserved manner the elections to the Supreme Soviet USSR, the collective of this advanced enterprise has joined the nation-wide socialist competition for fulfilling the 1958 plan ahead of time, for higher labor productivity, further development and adoption of new engineering methods. The telegraph operators and the personnel have assumed new socialist obligations.

In order to furnish exemplary telegraph service for the campaign and elections to the Supreme Soviet USSR, the telegraph workers assumed an obligation to provide high-quality processing of all telegrams marked "election", organize a continuous supervision over the arrival of such telegrams and to open a special telegraph branch at the quarters of the Central election commission. In addition, there will be a group working 24 hours a day at the tele-

graph to help the Central election commission to receive in time the telegrams on the arrival of voters and results of the elections.

The following are among the obligations assumed by the telegraph workers: to fulfil ahead of time the State plan for annual incomes and to exceed the plan by 1.5 million rubles; to overfulfil by 2% the annual task for higher labor productivity; a better use of engineering methods and adoption of advanced experience to improve the labor conditions, which will result from the further consolidation of the working time in all operating and technical services of the telegraph; to master the new phototelegraph apparatus and organize phototelegraph communications with the large telegraph branches; obtain an annual saving of 200 thousand rubles by adopting and introducing new proposals by innovators; to construct and use 1800 m<sup>2</sup> of residential area for the telegraph workers.

The collective of the Central Telegraph USSR appealed to all communications workers of the Soviet Union to join actively in the competition for excellent service to be given to the election to the Supreme Soviet USSR and for fulfilling the 1958 plan ahead of time.

The Collegium of Ministry of Communications USSR and

the Central Committee of communications workers, auto transport and highway workers union, at a joint meeting had approved the initiative of the Moscow telegraph collective. A resolution was adopted instructing the Ministers of communications of the Soviet Republics, administration of offices and enterprises, also the labor union organizations to organize a discussion on the appeal of the collective of the Moscow Central Telegraph USSR at the general meetings of the workers of all enterprises, and to contribute actively to the wide unfolding of socialist competition among the communications workers by creating the conditions necessary to fulfil the assumed obligations.

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The Collegium of the Ministry of Communications USSR

TO IMPROVE UNCEASINGLY THE SERVICE FOR THE  
TELEVISION RECEIVING NETWORK

Television enters more and more in the daily life of the city and rural population. Television ranks are joined by new centers and the receiving network is expanding. At the beginning of 1958, in Moscow and Moskovskaya Oblast alone, there were more than 950 thousand television sets. Under these conditions the servicing of the television network, which is taken care of by the enterprises of the "Gosradiotrest", is of great importance.

The Collegium of the Ministry of Communications USSR had recently discussed the work of Gosradiotrest, whose operating and economic activities were checked before by the Inspection of the Minister of Communications USSR.

The participants at the Collegium meeting, chief of inspection, comrade Ponomarev, chief of Gosradiotrest, comrade Turchanin, chief engineer of the trust, comrade Kanaeva, chief of the planning-financial department of the trust, comrade Badalova, managers of television studios, comrades Vasilyev, Rudakov, Khrollov, Levin, Muzikantov and others, while discussing the work done lately, for the

improvement of the service to television owners, paid special attention to the problems yet to be solved.

During 1956-1957, Gosradiotrest had opened 43 new television studios, of which 38 were opened last year. The present network of television studios handles in the allotted time the requests for installation and repair of televisions. This notwithstanding, the servicing of the television receiving net, also the production and economic activity of Gosradiotrest remains unsatisfactory. This is proven, first, by the large number of complaints made by the owners of television sets on the poor quality of repairs and incorrect connections of the receivers to their antennas. There are frequent complaints against the bad behavior of individual workers of the television studios.

The management of the trust and chiefs of the television studios do not pay enough attention to standardization of the radio mechanic's and radio installer's work, so that "equalization" tendencies exist in the present system of premium remuneration above the regular wages.

The Minister of Communications USSR, comrade Psurtsev, emphasized in his speech the importance of the work performed by the collective of Gosradiotrest and by its enter-

prises, who are called to furnish high-grade service to the millions of Soviet citizens. As a result of the measures taken during the last few years, conditions were created to put this service on a good foundation. The only thing that is necessary is a correct organization of this service, to increase the training of radio mechanics and installers and to raise at the same time their requirements.

The Collegium of the Ministry of Communications USSR placed Gosradiotrest under an obligation to introduce, as an experiment, guaranteed service to willing owners which will include with the repairs the replacement of all necessary radio parts except the picture tube, the cost of which is to be charged in case a replacement of the picture tube is necessary.

It was also considered necessary to revise the present statute on premium remuneration of radio mechanics and installers of the television studios, with the purpose of establishing different amounts of premium payments depending on the time, quality and amount of performed work. Radio mechanics should be assigned to definite sectors, so as to know the person who performed the work. During the first 6 months of this year, Gosradiotrest must establish reasonable standards for the number of spare parts and

materials needed for an installation, guaranteed and post-guaranteed repairs of television sets.

In connection with the fact that, beginning with 1959, it is planned to transfer the enterprises engaged in servicing the television receiving net to the Ministries of Communications of the Soviet Republics, it was proposed to develop a single structure to cover the organization of their activities under the new conditions.

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The Collegium of the Ministry of Communications USSR had also discussed the work of the Moscow television center and had instructed a commission headed by assistant Minister, comrade Topuria, to prepare the measures necessary to further improve its work.

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CERTAIN PROBLEMS CONNECTED WITH THE OPERATION  
OF THE NEW VRS ENGINEERING METHODS

During the last few years, the Rayon-wide telephone networks had introduced successfully rural relay automatic telephone exchanges (ATS VRS) with a capacity of 20 and 40 numbers and semiautomatic telephone devices (UPTS). The adoption of these device meant much work for the communications workers of the Tambovskaya Oblast, both in the erection, installation and testing the station equipment, as well as in the organization of its operation.

Our basic and most important problem was to develop a scheme for mutual communications between the ATS VRS with a capacity of 20 numbers (model KhTK3) and the city automatic type ATS-47 and S-29 telephone stations. The trouble was that the scheme developed by NIITS for ATS VRS with a capacity of 20 numbers is suitable for mutual work of this station only with manual telephone stations (RTS) of the MB and TsB type [local battery and central battery].

However, there were cases that made it necessary for us to connect the trunk lines from ATS VRS to the automatic telephone stations in Tambov and Michurinsk. For this purpose, the engineer of the Michurinsk ATS, N.S. Varnashin,



worked out a scheme (Fig.1) which made it possible to establish intercommunications between the model-KhTK3 20-number ATS VRS and the city ATS-47. Two ATS VRS of the Michuriskiy Rayon are already operating in accordance with comrade Varnashin's scheme. Communications from the city ATS-47 ~~pass~~ through to the relay ATS VRS pass through an auxiliary set VK installed at the city ATS. It consists of three type RPN relays, a choke coil and two 2 $\mu$ f capacitors. The connection from ATS VRS to ATS-47 is effected with the aid of a special adapter P containing five type RPN relays; this adapter is installed at the ATS VRS. As shown in the diagram of Fig.1, the incoming and outgoing traffics are separated, i.e., one connecting circuit is used for outgoing and the other for incoming traffic. This is a drawback for the scheme, since it lowers the use of the connecting circuits and increases the number of refusals of connections because the line is busy.

The technicians of the Tambov ATS, A.G. Kozlov and V.F. Markushin, had worked out another scheme for intercommunications between ATS VRS and the city type S-29 or ATS-47 automatic telephone station (Fig.2). The difference between this scheme and the one described before is that this one provides a two-way connection for the connecting circuits.

This scheme is used successfully by the ATS VRS of the Tambovskiy Rayon. The outgoing traffic from the Tambov city ATS to the ATS VRS is effected through a multiple jackfield IIGI (i.e., through the multiple jackfield of the last stage of the group selector) with the aid of a specially developed auxiliary set connected to one end, and adapter P connected to the other end of the connecting circuit. Circuit-diagrams of the auxiliary set and adapter are shown, respectively, in Figs. 3 and 4.

A city ATS client desiring an outlet to the ATS VRS must dial two numerals, the first of which determines the decade in the jackfield IGIU (IGI) of the city ATS, the second numeral determines the decade in the IIGI jackfield. If the connecting circuit is not busy, the auxiliary set to ATS VRS will become engaged. Upon receiving from ATS VRS the signal "station reply", the GTS client dials the two-numeral number of the ATS VRS subscriber. At this, the dialing pulses, which pass through the winding of relay I, are relayed by the latter to the relay of the ATS VRS.

The registration of the dialed number, the ringing and the signal "ringing control" are handled by the ATS VRS devices in the usual manner.

The set of the called client is released immediately

after the ringoff by the ATS VRS client; the connecting circuit and the PSL set of the ATS VRS are released only after the ringoff by the client of the city ATS.

To obtain incoming communications to the city ATS S-29, the connecting circuit of the latter is connected to the input IPI of the universal group (if no IGIU is present at the station, the connecting circuits may be connected to IPI, which are served by IGI). In this case, no auxiliary devices need to be installed at the city ATS. At the ATS VRS, the connecting circuit must be connected through an adapter.

The ATS VRS produced by the plant "Krasnaya Zarya" is equipped with an outdoor signalling the blowout of fuses and interrupted supply of calling current. In our opinion, this signalling system is inadequate. It should be supplemented with signal announcing damages in the client and connecting circuits, and signals announcing damaged cord sets and RSL sets. Such a signalling system will not complicate the station equipment and will not increase the power consumption, but will ease considerably the maintenance of the station equipment and will help to restore quickly the service in case of damages. Normal ATS VRS operations require the development of a simple and easily

handled testing equipment. Such equipment should be delivered by the plant together with the station equipment.

Among the more mass types of equipment for VRS is the device of semiautomatic telephone service (UPTS). With the aid of this device, subscribers of small-capacity switchboard units can obtain 24-hour telephone service with the same number of telephone operators.

After a UPTS is repaired, it must be checked and adjusted. This work is very difficult to perform directly at the branch quarters. We designed a special test table for checking the UPTS in the shop and in the large junction communications offices. The design of this test table is shown in Fig.5. The switchboard 1, which goes with the table, is a switchboard used in Rayon centers and its auxiliary set can be either of the MB or TsB system, depending on the equipment system installed in the Rayon centers of the Oblast. The switchboard 2, which is a switchboard type used in branch offices, serves to connect the client's circuits (through artificial lines) and the telephone instrument.

The technical personnel, which attends to the UPTS, experiences great difficulties in trying to locate the damages, since, in addition to the technician, the operator

of the Rayon center located at a distance of several kilometers from the branch office must also help to find the damage. In such cases, the only connecting circuit between the branch office and Rayon center is engaged only for this purpose.

Therefore, the need for a portable testing device for checking the UPTS made itself felt during the first few days of the UPTS operation. Since the technician of the UPTS must also service other facilities of Rayon-wide communications, we made it to be an all-purpose portable tester. It can be used for a complete checking of the operation of all relays of the UPTS without occupying the connecting circuit, it can be connected to any client or connecting circuit of manually operated telephone stations, also to individual ATS VRS 20-number client circuits, it can send a call to these stations and receive from them the "ringing" signal, also to check the correctness of the speech circuit with the switchboard operator and with any GTS and ATS client. In addition, the device makes it possible to use direct current for checking the ohmic resistance and the insulation resistance of the client and connecting circuits. The circuit-diagram of the device is shown in Fig.6. For measuring the resistance of wires to the place of their cross, it is necessary to press down the button KnI and

transfer key KII to position "L<sub>2</sub>"; for measuring the resistance of wires to their contact with the ground, key KII is transferred to position "L<sub>1</sub>" or "L<sub>2</sub>". The device is assembled from parts taken off the line of system MB portable telephone apparatus and from switchboard; to these is added an ohmmeter.

B.G. Nalbandyan, Chief of the  
Tambovskaya Oblast communications control office.

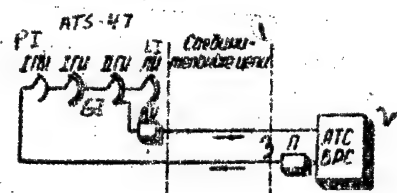


Fig. 1

1) Connecting circuits, 2) ATS VRS, 3) adapter P.

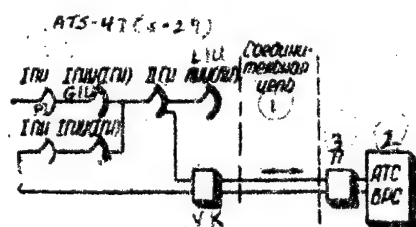
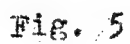


Fig. 2

1) Connecting circuits, 2) ATS VRS, 3) adapter P





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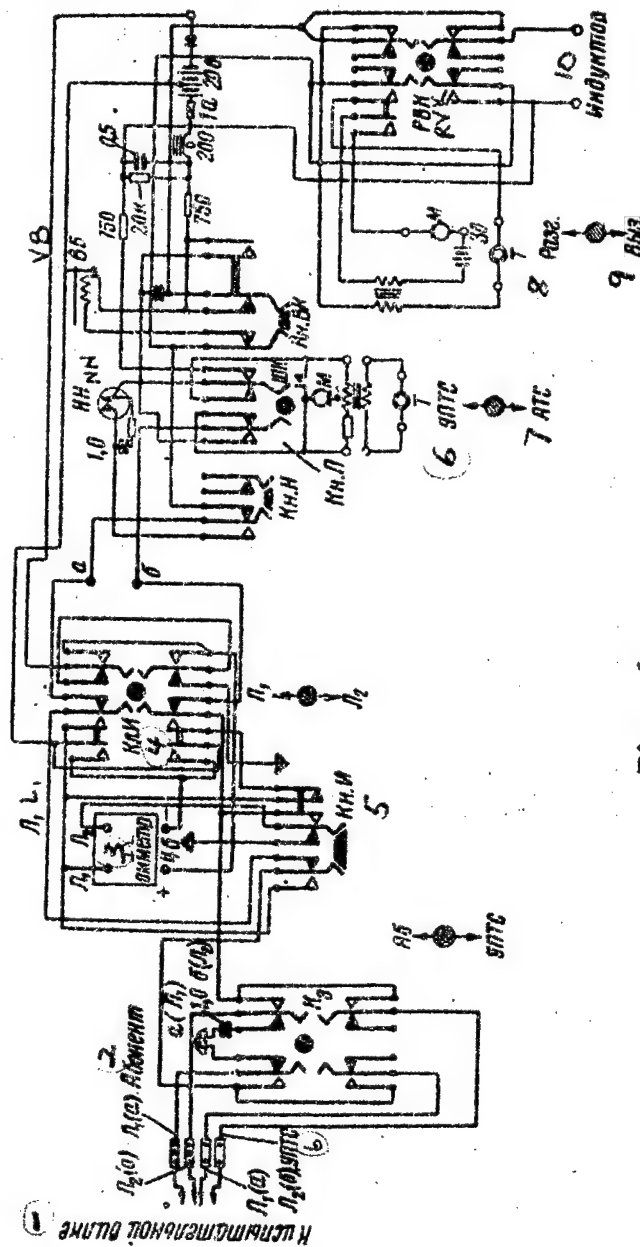


FIG. 6

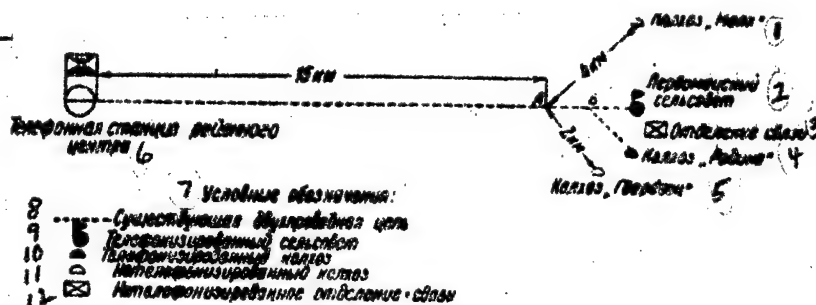
- 1) To the testing plug, 2) client, 3) ohmmeter, 4) key I,  
 5) button I, 6) UPTS, 7) ATS, 8) message, 9) call,  
 10) magneto.

OUR EXPERIENCE IN THE DEVELOPMENT OF  
RAYON-WIDE COMMUNICATIONS

Our plan for the next few years is to complete the installation of telephones in the kolkhozes of our Republic, which will help the kolkhoz village workers to fulfil their tasks. But our intention is hindered by the inadequate amount of money and certain line materials, which annually allocated for needs of the Rayon-wide communications of the Chuvashskaya ASSR. These difficulties notwithstanding, in order to expedite the completion of the rural telephone communications, the DRTS of the Chuvashskiy office of communications is planning to equip the kolkhozes and the rural communications branches with semiautomatic telephone service (UPTS).

The expediency of using UPTS can be seen from the following example.

Shown schematically on the drawing is the existing line of the VRS [Rayon-wide communications] extending from the telephone station of the Rayon center towards two kolkhozes "Mayak" and "Gvardeyets", which have no telephones, and towards the "non-telephonized" communications branch located at a distance of 17-20 km from the Rayon center.



- 1) Kolkhoz "Mayak", 2) Pervomayskiy selsoviet; 3) communications branch, 4) kolkhoz "Rodina", 5) kolkhoz "Gvardeyets", 6) rayon-center telephone station, 7) legend:, 8) present two-wire circuit, 9) telephonized selsoviet, 10) telephonized kolkhoz, 11) non-telephonized kolkhoz, 12) non-telephonized communications branch.

Let us examine the two possible solutions for the telephonization of these two places: 1) direct telephone connection with the telephone station of the Rayon center, 2) the use of UPTS.

In both cases it will be necessary to construct, from point A on the main line, a 4-kilometer line to the kolkhoz "Mayak" and a 2-kilometer line to the kolkhoz "Gvardeyets".

In addition, by using the first variant, it would be necessary to install in a section, extending from the switchboard to point A, two circuit each 15 kilometers long, since the existing rules forbid the inclusion of more than two telephones in one circuit.

The installation of two circuits with a total length of 30 kilometers would cost 11 thousand rubles. The "non-telephonized" communications branch is located not far from the Pervomayskiy selsoviet and, by extending from it to point A a 1-kilometer long circuit, it will be possible to connect it in parallel to the line of the to be "telephonized" kolkhoz "Gvardeyets". Consequently, the telephonization of these three objects, including the construction of the pole lines, would require 18 thousand rubles, i.e., 6 thousand rubles for each object.

According to the second variant, instead of installing two circuits from the Rayon-center telephone station to point A, we will install a UPTS in the communications branch from which we will extend two circuits to the Pervomayskiy selsoviet, one circuit to point B and two circuits to point A, so that we can connect to the latter the telephones of kolkhozes "Mayak" and "Gvardeyets". The total length of these circuits is 3 km; consequently the cost of their installation, including the cost of the UPTS, will not exceed 2,2 thousand rubles compared to 11 thousand for the first variant. The total cost of telephonizing these three objects will 9.2 thousand rubles, or 3.1 thousand rubles per object, which is two times less than for the

first variant. It will require 3.7 times less of wires and other line materials.

It follows from what was said above that the second variant is certainly the more economical.

Inasmuch as telephone service is concerned, the probability of getting a connection with the rayon center is 50% with the first variant, since only two telephones can be using the same circuit; with the second variant this probability is three times less. In telephone work, the number of connecting lines between the rural switchboard unit and the telephone station of the Rayon-center is usually determined on the basis of one connecting line per 10 telephones, i.e., the possibility of getting an outlet to the Rayon center will be five times less than the probability of getting a connection to the Rayon-center through one of the paired telephones directly connected to the telephone station of the Rayon-center. Also to be taken into consideration is that a 10-number rural switchboard has no 24-hour service; hence, not only is there a smaller chance of getting a connection with the Rayon-center, but the time for getting a connection is also limited; these unfavorable features can be avoided by using a UPTS. As far as the ability to establish communications between clients of this sector is con-

cerned, the proposed system is by far worse than with a switchboard of the manual system; compared, however, with the present system of individual circuits for two clients, it is less unfavorable since, in the case of paired telephones, the probability of absence of connection is proportional to 4 (two telephone sets per circuit), while with UPTS it is proportional to 7 (six clients of the UPTS substation and one client - the switchboard of the Rayon-center. It should be kept in mind, however, that most of the clients of such a small sector require connections with the Rayon-center more often than connections between themselves.

Consequently, the installation of UPTS will make it possible to furnish 24-hour service and, in our opinion it is not a bad solution of the problem.

Inasmuch as the perspective plan for the development of the VRS network is concerned, as well as the further automation of communications, this system will not hinder the complete automation, on the contrary, it will serve as the preparatory stage for this transition. If it will be necessary to equip additional client points in the sector to be telephonized, it can be accomplished (as in the first variant) by installing additional circuits, or by installing a second UPTS with a circuit to the Rayon-center. In

each specific case, these problems can be solved without any difficulties.

In accordance with the plan of the past year, the work on telephone installations was carried out by using UPTS; the same will be done in 1958 on a larger scale. The 1958 plan provides the "telephonization" (mostly by this method) of 108 kolkhozes and 24 communications branches. The cost of providing telephone service to these 132 objects will amount to only 295.5 thousand rubles, i.e., to 2.25 thousand rubles per each object. It will require the hanging of 706.3 km of wire, i.e., an average of 5.4 km of wire per object. The execution of the 1958 plan will enable us to take a decisive step towards the completion of the telephone work for the kolkhozes of our Republic. The remaining 90 kolkhozes, the "telephonization" of which is somewhat more complicated, will be able to get telephone service in 1959-1960; consequently, we will be able to complete during the 6th 5-year period the "telephonization" of the kolkhozes of our Republic. At this, most of the kolkhozes will get 24-hour service with the Rayo-center and an outlet to the long-distance telephone network.

L.M. Likhtenfeld, chief of Chuvahskaya  
Directory of the radio-relay network.

### HOW WE ARE IMPROVING THE SERVICE FOR SUBSCRIBERS

(From the operating experience of the collective of the Rostov-on-Don long-distance (MTS) telephone station).

Long-distance telephone stations can achieve higher income and larger outgoing paid traffic by developing its facilities, improving the quality of its work and better service to the population, enterprises and organizations.

The structure of outgoing paid traffic in our station is made up of 69.9% for long-distance service to government organs and 30.1% to the population. The greatest portion of call bookings from the population are those made in the public telephones.

All fourteen public telephone stations of the Oblast-center were formerly under the jurisdiction of the long-distance station. During the second half of 1955, nine of these were turned over to the Post-Office. It must be mentioned that, after this transfer, the traffic was reduced sharply and the number of complaints against the work of these stations increased.

This situation was caused by the frequent replacement



of the public-telephone personnel, who were not familiar enough with the rules for long-distance telephone service. Little attention was given to the public telephone service. Taking this into consideration, also the necessity of expanding the net of non-serviced telephone booths, we decided to transfer, beginning with the second half of 1957, the public telephones back to the long-distance telephone station.

In order not to increase the personnel, we are now installing non-serviced telephone booths in hotels and in communications branches not overloaded with work; the sale of call tickets in these places is attended to by the workers of the hotels and communications branches. Having purchased a ticket, the client can make a call from any booth.

The no-delay system of service is already in effect in the Rostovskaya Oblast for more than six years. Before adopting this service, it was necessary to make sure that the number of existing channels is adequate for handling not less than 90% of the calls with a waiting period of up to 10 minutes. The analysis of the bookings and a study of the time spent in different processing stages proved that we have the ability to apply the no-delay system and that the predominant majority of calls can be executed without delay.

Experience proved that a station can be transferred to no-delay operation, if use is made of no more than 35% of communications channels. The transition to this system led to a smaller number of processing stages executed inside the station, which formerly, as a rule, took up 5 minutes. This was accomplished by eliminating the stages in which call tickets would go to the booking table, then to the inspection table and from there to the line switchboards.

The no-delay system offers the telephone operators a great opportunity to improve the service by the communications channels and to raise their labor productivity. Good work was done by the advanced workers of the station, comrades Azizyan, Smolyayeva, Barsukova, Makhova and others. Their experience was made known to everyone, so that other operators can benefit by their experience.

Since the introduction of the no-delay system of operation, the average waiting time for getting a long-distance connection was reduced from 26.1 to 12 minutes. During the first half of 1957, 85% of the calls were executed within 10 minutes. In 1956, the number of calls with a waiting time of up to 10 minutes was 91% of the total calls placed. The number of "waitings" of more than 10 minutes was higher in 1957 because, since January 1957, our station began to

function as a large through station, in accordance with the new plan for through traffic. The result was that the daily average traffic has been increased by 15.3%, and the increase was mostly in the through traffic. For the first half of 1957, the plan for through traffic has been fulfilled by 141.8%,

Certain sections of the switchboard room had to be reorganized in order to be able to use the same staff for handling a daily average of 8000 calls, as was used in 1956 to handle 6500 calls per day. However, the measures taken to improve the through traffic only at the main station are inadequate to eliminate the defects present in the method of directing the through traffic and in the work of certain long-distance telephone stations.

The method of directing the through traffic over the Soviet Union does not eliminate the necessity of making information calls to several MTS on the possibility of getting a connection to the required point, which leads to a reduced utilization of the channels and prolonged waiting for a reply to the inquiry.

According to the plan for through traffic, our station is obliged to allow to many MTS to put through-calls to

cities with which Rostov has limited business, while the outgoing station is scheduled to operate regularly with those cities. The method does not take into account the presence of planned through traffic between individual cities, with the result that the same cities with planned through traffic are included in the scheme for directing the through traffic.

These defects hinder the rhythmic work of the through traffic service and causes other MTS to bring complaints against our station.

The method of directing the non-planned through traffic must be periodically reviewed and made more exact in order to reduce the load of the main stations, improve the audibility and reduce the number of through points. It is also necessary to exclude from this method the cities, whose schedule of work involves a considerable amount of time spent for planned through traffic, which will make it possible to improve considerably the service between the through-traffic points. It is necessary to establish different time-standards for information calls: five minutes for Oblast-wide stations and cities with 24-hour service; and 1 hour for cities and through-traffic points operating without a schedule.

The development of the through traffic is obstructed considerably by the fact that among the indexes used for the evaluation of the MTS performance is also included the fulfilment of the plan for outgoing paid traffic. In many cases, the interest shown to the fulfilment of this plan is the factor hindering the growth of the through traffic. An analysis of the traffic of our MTS shows that, in the first half of 1957, the fulfilment of the plan for through traffic was equal to the fulfilment of the plan for paid outgoing traffic.

Improved through traffic service can be accomplished, in addition to organizational, also by a number of technical measures. Among these should be included the equipping of a special information desk and regulation of the bookings of orders for calls, this desk to contain a pushbutton indicator with an electrical circuit diagram showing the load in any route at a given time, so that the operator of the line-switchboard by means of special jacks in the multiple jackfield would know the number and the route available for a through traffic call.

Our station's present cartridgeless pneumatic-tube conveyers should be reequipped, so as to be able to send the order blanks from each operator of the switchboard

to other work places and return the processed blanks for sorting.

The technical personnel of the station is presently working on the automation of the information desk and to redesign the cartridgeless pneumatic-tube conveyer.

An important factor in speeding up the production process is the semiautomatic method of connecting the subscriber telephones. At the present time, we have ten incoming communications channels operating with the semiautomatic connection system. The introduction of semiautomatic service made it possible to release six operators with a monthly payroll of 2520 rubles, also to reduce the time for making a connection by an average of 60 seconds and to increase the operator's productivity. By using for each channel an average of seven calls per hour, the carrying capacity of the channel can be increased by one call per hour, or by 14.2%.

Our production laboratory is presently working on a simplified method of changing twelve Oblast-wide channels to semiautomatic service.

The conveying of all sorts of documents from service to service and from one work place to another is practiced in

many communications enterprises. Conveyers of various designs are used for this purpose. In our station, the efforts of our innovators under the guidance of engineer Mikhailishchev succeeded in designing, producing and putting in operation a cartridgeless pneumatic conveyer. The distinguishing feature of this design is the use of a single tube for 20-25 work places. At the work places of the line switchboards are mounted into the tube receivers equipped with remote control effected from the inspection-distribution desk; the moving blanks are intercepted by the receivers at the proper work place. All parts of the pneumatic conveyer are made from organic glass (plexiglass). The compressed air is produced by suction fans type PEMZ-1 which raise the pressure to 1000-1100 mm H<sub>2</sub>O.

The use of the pneumatic conveyer raised the question of redesigning the work place of the inspection-distribution service, which was done. A special desk was made for the telephone operator (of the inspection-distribution service and a control-board for the receivers of the pneumatic conveyer was also produced. Installed on the desk is a card file with personal bills, on each 65cm x 18 cm frame of the file are 200 personal bills. To the right is installed a table with a drum-type file for the call tickets.

The mechanization of these production processes made it possible to reduce a part of the staff and, in addition, the time for executing a call order inside the station was reduced from 5 minutes to 1.5 minutes.

In order to increase the productivity of the station employees and reduce the production losses in the shops, it is planned to reform the system of conveying order blanks from the call-booking switchboards to the inspection-distribution desk, and it is planned to use a pneumatic method of gathering the order blanks and install electric counters at the work places of the call-booking switchboards.

One of the important factors for the reorganization of the information desk service will be the planned installation of direct automatic communications between the central public telephone station and the line-switchboard operator, which will use the method proposed by the technical personnel of the Saratov MTS. By using this method, the operator of the booth switchboard will be able to dial the needed number and connect her telephone set to the service line of any work place in the switchboard room.

The semiautomatic method of connecting subscriber telephones, the operation of the pneumatic conveyor and the



carrying out of other measures made it possible to release twelve employees and use them for the expansion of the production.

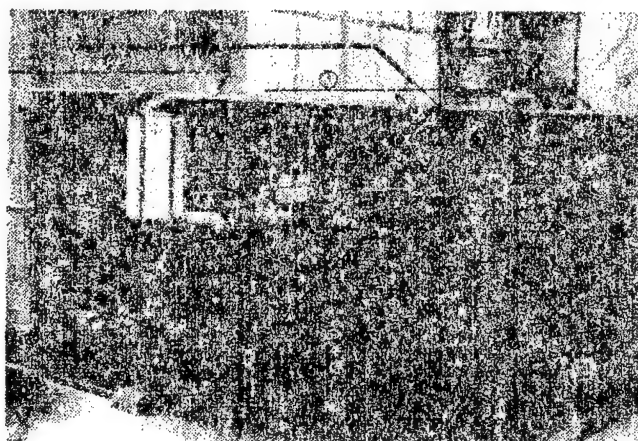
Of special great importance is the automation and mechanization for the enterprises which have changed to cost accounting. The MTS of Rostov-on-Don is using cost accounting since 1953. This confronted the collective with the task of further increasing the labor productivity and reduction of production costs, and the collective managed to accomplish it successfully. The production volume is increasing from year to year; the same applies to the productivity of labor, while the production costs are reduced systematically.

The improved cost accounting results were due to the work by innovators and especially to the installation of additional communications channels. In 1956-1957, the technical personnel of the station had installed 56 new communications channels which produced an additional income of 1 million 200 thousand rubles and increased the traffic by 50,000 calls. Under cost accounting conditions, the performance of our station in the matter of fulfilling the State traffic and income plan has been improved.

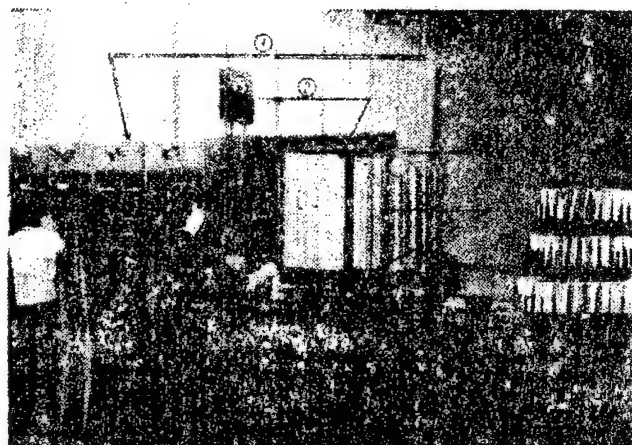
Cost accounting increases the responsibilities of the

management. However, the limitations placed upon the administrators' rights to organize the production process prevent them from changing the structure of the production staff to suit the needs of the enterprise. As the case is, the staff is controlled by the communications office. This contradicts the requirements of cost accounting. The chiefs of enterprises operating under cost accounting should be given the right to change the structure of the production staff within the limits imposed by the labor and wages plan, which will result in a more flexible administration of the enterprise.

A.A. Akopyan, chief of the Rostov-na-Donu long-distance telephone station.



Switchboard room of the Rostov-na-Donu long-distance telephone station: 1) line-service switchboards, 2) flat pneumatic-tube conveyer; 3) receivers.



The switchboard room of the Rostov-on-the Don long-distance telephone station: 1) Call-order switchboards, 2) personal accounts file, 3) call ticket file, 4) operator's desk.

DEVICES AND METHODS WHICH HELP THE LAYING OF  
UNDERGROUND COMMUNICATIONS CABLES

While carrying on with their work in laying cables in the telephone conduit, our communications workers have found new methods and also suggested the use of simple, but effective devices which help to increase the labor productivity and improve the quality of work. Some of these methods and devices will be described in this article.

.THE WRENCH FOR CONNECTING AND DISCONNECTING THREADED RODS. As it is well known, special threaded rods 1 m long are used in the preparatory work for pulling the cables through. These rods are joined together manually and are gradually pushed through inside the conduit. Since the span length between two adjacent manholes is on the average equal to 100 m, the preparatory work for only one span requires first the joining and then the disconnecting of 100 rods.

To speed-up this time-consuming work, engineer A.V. Puchkov, suggested the use of a special wrench and small lever. The design of the wrench is shown in Fig.1a. The wrench consists of a hollow pipe 1, on one end of which are two slots 2; to the other end of the pipe is welded a steel

plate 3 which is attached to the handle 4. A small chain (or soft wire) serves to tie the pin 5 to the plate 3.

For using this device, holes a and b are drilled through each threaded rod at a distance of 50-60 mm from their ends (Fig. 2).

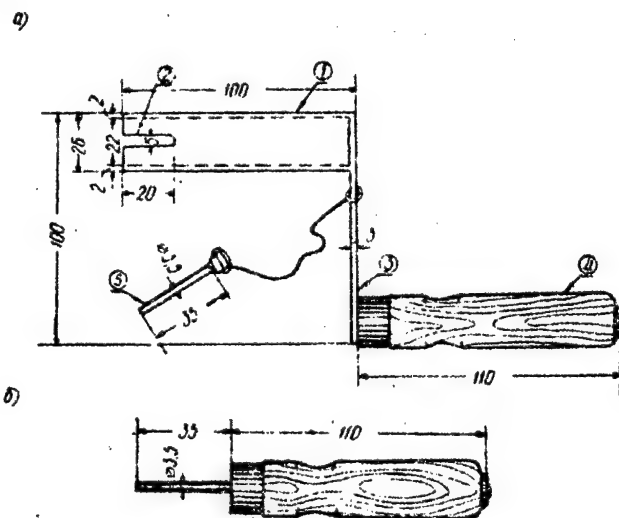


Fig. 1

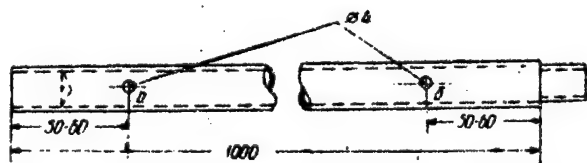


Fig. 2

The rods are screwed together with the aid of the wrench and small lever in the following manner (Fig.3):

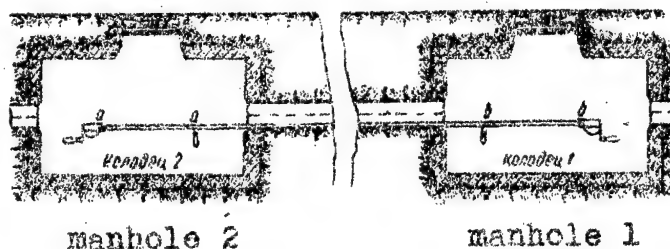


Fig. 3

The first rod, with its thimble screwed on it, is pushed through from manhole 1 to the pipe conduit to one half of its length. then, the rod of the lever is inserted in hole b of the same threaded rod to hold it in a stationary position. Into the hole b of the second rod is inserted the pin, while the wrench is put on the end of the rod in such a manner, as to allow the pin to enter the slot of the rod. The first and the second rods are screwed together by turning the wrench clockwise and, then, the second rod is pushed into the conduit by one half of its length. The rest of the rods are joined the same way and are pushed until the first rod will come out of the conduit of manhole 2.

The unscrewing of the rods in manhole 2 is performed in the same manner, but the wrench is to be turned counter-clockwise and the lever and the pin inserted in hole a.

PREPARATORY WORK METHOD PREVENTING THE POSSIBILITY OF LOSING THE THREADED RODS IN THE CONDUIT. When pushing the threaded rods through the conduit there is always a possibility of their becoming disconnected because of the poor threading or due to them becoming unscrewed. In such cases, a part of the rods remains in the conduit and it is very difficult to have them removed. In connection with this, engineer A.V. Puchkov suggested to attach a multistrand wire or a rope to the first and last rods (Fig.4), when pushing the rods through the conduit. If the rods become disconnected before the first rod enters the manhole 2, all rods are then removed in manhole 1 (part of the rods are extracted with the aid of the wire tied to the first rod, and the other rods are extracted by grabbing the last rod).

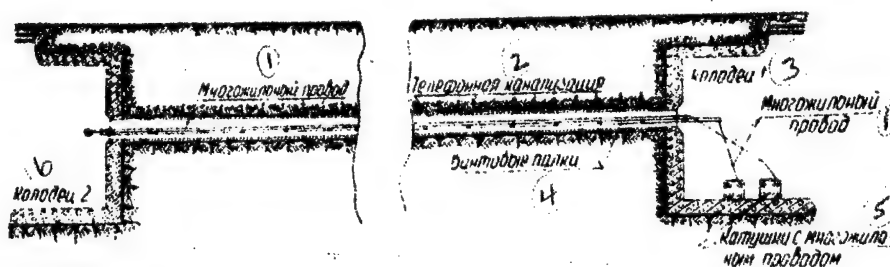


Fig. 4

- 1) Multi-strand wire, telephone conduit, 3) manhole 1,
- 4) threaded rods, 5) reels with multi-strand wire,
- 6) manhole 2.

If, however, the rods become disconnected after the first rod enters the manhole 2, the first group of rods are to be pulled out the conduit to manhole 2, and the other group of rods are to be moved to manhole 1 with the aid of the wire tied to the last rod. In the latter case, there is no necessity of a repeat pushing of the rods, since the wire which is tied to the first rod will be drawn-in the conduit.

PREPARATORY WORK PERFORMED DURING THE LAYING OF TELEPHONE CONDUIT. The supervisor M.A. Permyakov's proposal is, simultaneously with the construction of the telephone conduit, to perform the preparatory work so that, when the piping work is completed, all conduits would be ready for checking with the inspection cylinder, and also for the subsequent pulling of the cables.

If, during the laying, the pipes are to be connected by means of metallic sleeves, the preparatory work is performed as follows (Fig.5a): Using a 4-5 mm steel wire which is 1 m longer than the length of the laid pipe, the multi-strand conductor is tied to one end of the steel wire, the second end of which is passed through each of the pipes going into the trench, until the last pipe is joined with the adjacent pipe. In this manner, the multi-strand conductor is gradually pulled in the conduit, while the pipes



go into the trench.

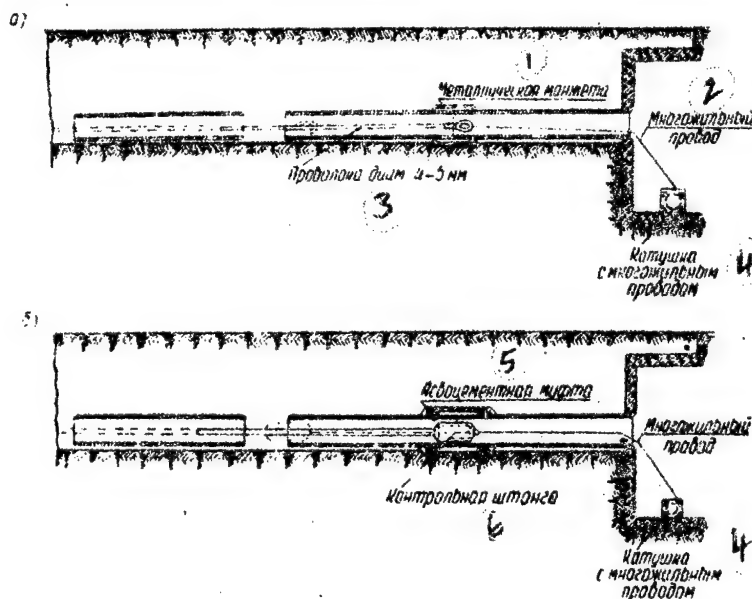


Fig. 5

1) Metallic sleeve, 2) multi-strand conductor, 3) wire 4-5 mm in diameter, 4) reel with multi-strand conductor, 5) asbestos-cement coupling, 6) inspection rod.

If, however, the pipes are joined by asbestos-cement couplings, the multi-strand conductor is to be tied to the clamp which is attached to the billet of the inspection rod (Fig.5b). In this case, the rod serves for both the centering of the pipes as they are joined together, and for pulling the conductor through the piping duct.

USING A WIRE FOR PULLING A CABLE THROUGH DUCTS OCCUPIED BY OTHER CABLES. Ordinarily, a thin rope is used for pulling cables through ducts occupied by other cables; the rope, however, wears out rapidly and loses its strength. The use of a bare steel wire for this purpose is dangerous, as it may damage the lead sheathing of the already laid cables.

The supervisor A.A. Medvedev suggested the use of a steel wire with a rope wound around it for pulling cables through already occupied ducts. Such combination wire is prepared manually: the rope is untwisted and is gradually wound around the wire. The rope should be wound in a direction opposite to the twist of the wire strands.

Ye .B. Litvishko, engineer.

## Innovations and Inventions

### UNIVERSAL MACHINE FOR THE CONSTRUCTION AND REPAIR OF UNDERGROUND AND OVERHEAD RADIOFICATION AND VRS LINES

The unfavorable feature of the present day cable layers is that they are attached and driven by a tractor.

In 1957, the innovators I.A. Kanivets and Ye.Ye. Makarov have designed a self-propelled cable layer for laying the lead-out wires of the underground lines to the residences, which has an entirely new operating principle.

The cable-laying mechanism consists of a cone-shaped milling cutter-- a knife with cutters for softening the ground, and a drive to impart a reciprocating motion to the rotation of the milling cutter with a swing amplitude of  $220^{\circ}$  ( $110^{\circ}$  each to the right and left). During the forward motion of the machine, the rapidly swinging milling cutter located in the ground cuts it in the direction of the motion and travels back. Its cutters, while shoving the earth in the direction of the cable, pack it in the place where the cable is to be laid. Hence, the milling cutter moves in the ground without leaving an open place behind it. Since the cutter 1 is attached in front of the machine (Fig.1), the cable (lead-out) can be laid up to the wall of

the house, which the present cable layers are unable to do.

The cable to be laid passes through a special duct located inside the milling cutter. In the lower part of the cutter is attached with hinges the bent tube 2. Despite the rapid swinging of the cutter, this tube remains stationary to prevent damaging the cable.

Constructionally, the cable layer is designed as a self-propelling unit with the propelling portion and the engine 3 developing about 40 hp. The burying of the cutter before the laying of the cable is effected by a boring-tool device, which can also be used for digging holes under the poles.

The boring tool 4 is 420 mm in diameter and is good for digging holes up to 1.5 m deep; it can do it without a stop by the action of the forward stroke of the screw 5. Upon the return stroke of the screw, the ratchet clutch 6 becomes disengaged from the operating part of the bore and the latter moves up without a rotary motion. The removed earth remaining on the blades of the boring tool can be transported to any place by the cylindrical device surrounding the boring tool (not shown on the drawing). The earth is thrown off the boring tool by the centrifugal force generated by the rapid rotation of the tool. Its work results in a cleanly dug hole, no manual removal of dirt is needed.

Among the components of the universal machine is the loading-unloading mechanism. The loading on and the unloading from the truck the poles, adapters and other loads weighing up to 600 kg is performed by a projecting horizontal boom 7, which is fastened to a 3.9 m high mast 8, a lifting winch 16 and a hook with pliers 15. The boom can rotate in a horizontal plane over an angle of  $200^{\circ}$  together with the block 9. This design makes it possible to lift and move the load from one side of the machine to another.

The installation of poles is performed in the following manner: the shank of the pole is supported by the cradle 10 and, when lifted, the pole descends by sliding down the chute 11. The clevis 12 prevents the pole from swinging. At the upper part of the boring tool platform is another (a guiding) clevis 13, which serves for the final alignment and installation of the pole in a vertical position.

The entire work on installation of poles, including the squaring of the pole and packing the ground, can be performed by one lineman and driver of the machine. The design of the machine makes it possible to dig holes in the immediate proximity of the poles, which makes it possible to use the machine for installation of adapters and removal of old poles from the ground.

For replacing one pole with another, the new pole is lifted, as explained above and its upper end is held by the clevis 13 and its lower part is grabbed from both sides by the special clamping screws 14. Held fast in this manner, the pole is transported to the hole and, by loosening the screws, it is lowered by the winch into the prepared hole. The communications wires are then hung from the old to the new pole; the old pole is clamped with the screws 14, pulled out from its hole and is taken away in a vertical position.

The design of the machine makes it possible to install poles in swampy and soft grounds by pressing the pole in the ground (instead of rolling as it is done manually).

The mechanisms of the universal machine are driven by engine 3. The required rpm is produced by three gear boxes.

In order to reduce the height of the machine during transportations, the designers suggest another variant of the boring tool tower on hinges. Such a tower can be folded increasing, thereby, the passing-through ability of the machine.

Such an all-purpose machine can find a wide application for the repair and construction of overhead and under-

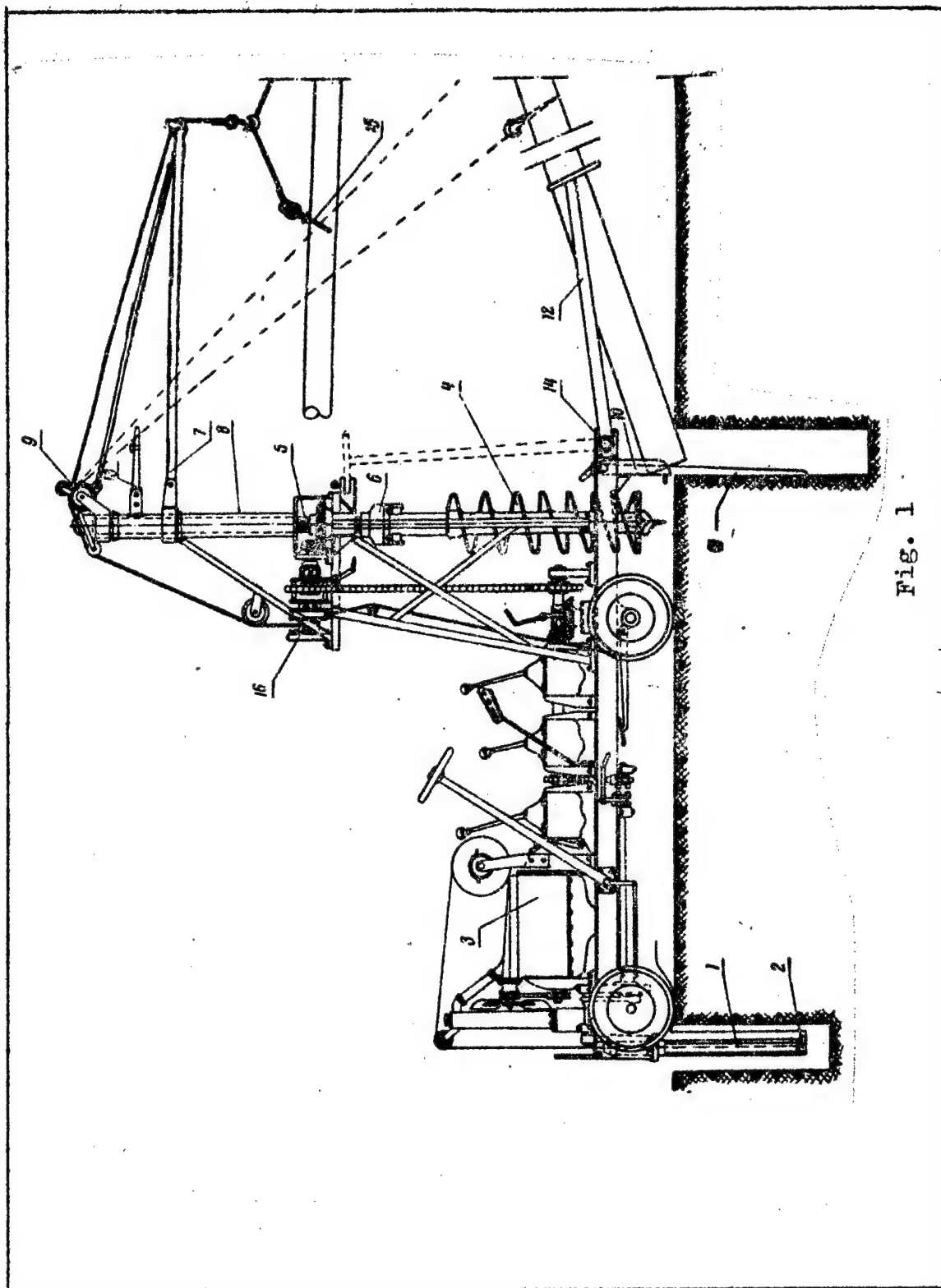


Fig. 1

ground communications lines. The external appearance of the cable layer is shown in Fig. 2.

The machine was tested by laying a cable in polychlore-vinyl insulation to a depth of 0.8 m, boring holes with a diameter of 420 mm and a depth of 1.5 m and installation of poles 13 m high. On the basis of the test, the machine was considered good, the mechanism for laying of cables and several other units have been recognized as new and original. However, certain units of the machine need to be improved. This will be done this year by the Ministry of Communications of the Kirgizskaya SSR.

Ya.G. Rozenberg and V.P. Klimov,  
engineers.

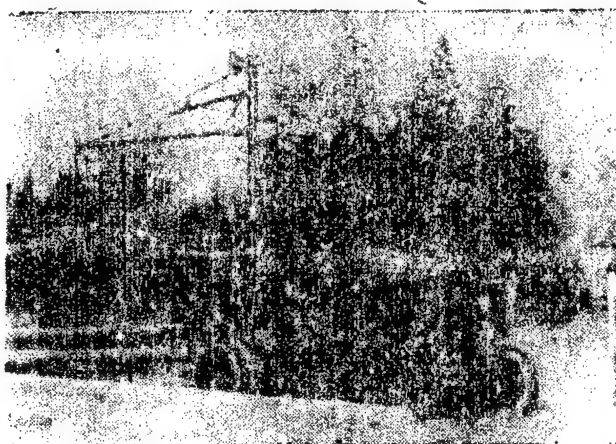


Fig. 2



## Communications Engineering Abroad

### RADIO-SERVICE ENGINEERING IN CERTAIN WEST-EUROPEAN COUNTRIES

Radio-service engineering abroad is very widely developed. Many West-European and USA firms, which specialize in this field of engineering, are marketing a wide variety of radio instruments and equipment, such as, amplifiers, loud speakers, magnetic sound recorders, devices for translating speeches into other languages, etc.

This review will describe only a few of the most interesting developments by the West-European firms in the field of radio-service engineering.

The unit for a simultaneous translation of speeches into different languages. Most of the firms of Western Europe engaged for a number of years in producing various types of wire units with which we are well familiar. Of certain interest is the production of radio units which began a few years ago. Thus, for example, the firm Siemens-Halske (Austria) is producing a radio unit for the simultaneous translation of speeches into four languages, operating in a range of long waves (60-140 kops). The units use 8-watt receivers with loop antennas. The reception within

the loop is effected by transistorized receivers operating in four frequency ranges. The ferrite antenna is built-in into the receiver housing.

The receiver is mounted in a plastic case whose dimensions are 110 mm X 72mm X 30 mm and it weighs 200 g. It is supplied with power from a special small type DK-225, 1.22v storage battery providing 55 hours of continuous service.

The listener keeps the receiver on his neck with the aid of a belt. In this position, the ferrite antenna is perpendicular to the plane of the transmitting loop antenna which is needed for the optimum receiving conditions.

The system is controlled by a special control board. The unit makes it possible to carry on with both direct translation and a retranslation. The optimum length of the transmitting loop antenna is 100-150 m and it is located along the perimeter of the audience room. According to the firm, with properly selected transmitter power, carrier frequency and antenna design, the unit will not produce sizable interference at a distance of more than 100 m from the antenna. The unit can be rapidly diversified, although only stationary models are now produced.

If specially ordered, the firm can produce<sup>a</sup> set for

eight ranges (languages), but these units are supplied with an additional transmitter bay. In this case, the receiver is rebuilt for another range, i.e., a 8-channel unit uses two types of transmitters.

The wire type of units produced by West-European firms use the wire-bus system. For example, the firm Siemens (Italy) is producing a wire type stationary unit for five or more channels (languages). The switching in this unit is very simple and is designed mainly for a direct translation or for a retranslation with the reswitching done by the translators. Control of the unit and ten other microphones used for speeches in the room or at a round table can be effected from the control panel.

A similar design is used for the wire units of the Dutch firm Philips, West-German firm Telefunken and others.

The firm Telefunken is producing wire-type translation units of the portable type, which are assembled with multi-wire cords with plugs.

A study of many wire units produced in West Germany, Holland, France, Italy, also by the State enterprises of Czechoslovakia, German Democratic Republic, Hungary and others, shows that none of them contain any original or

unknown to us engineering ideas; in many cases these units are not as good in switching ability as the similar models produced in our country during the last few years. Inasmuch as radio units are concerned, there<sup>are</sup> unquestionably many worthy engineering designs.

The mobility, flexibility of the radio translation units, the possibility of their application in addressing large masses, where secrecy is of no importance, represent, undoubtedly, a marked advantage over the wire-type of such units. However, these units, especially those operating with long, medium and short waves, are affected by interferences, which to certain extent limits their field of application. In this respect, worthy of note are the translation units produced in USA, which operate within the range of ultrashort waves and are adequately protected against interferences.

Of considerable interest are the one-channel translation units using audio-frequency waves. Here, just as in high-frequency units, use is made of a loop pickup which is actuated by a audio-frequency amplifier. The magnetic field of the loop actuates the ferrite antenna of the transistorized listener's amplifiers. These amplifiers are slightly larger than a match box and get their power from a 1.5 v

battery. The firm Philips, which produces such units, is recommending their use in theaters.

It should be noted that the field of application of such units can be very large; for example, they can be used for dispatcher communications, in transportation, hospitals etc.

Amplifiers and sound-amplifying units. Except the English, the West-European firms are producing mostly low-power amplifiers, from 5 to 250 watt; these are often combined into units, if higher power is necessary.

The English firms are producing both low-power and relatively high-power amplifiers. Thus, the firm W. Bryan Savage Ltd is producing amplifiers with a power of up to 10 kw, a frequency band of 40-10,000 cps and a harmonics factor of up to 3%.

The English firm Trix is producing portable amplifiers of various power for mobile installations. These amplifiers can be supplied with power from a a-c network and from the automobile storage battery.

Amplifiers, whose performance is very good, are produced by the Italian firm Urve. Its 30-watt U-15/C amplifier operates with a wide frequency band, has a harmonics

factor of 1.5-2% and weighs 10 kg. Approximately the same specifications is possessed by the 120-watt type U-25/C-2 amplifier (weighing 36 kg) and others. The French firm Paul Bouyer began the production of transistorized amplifiers for sound mobile installations. These are used in tourist buses, police cars, sport announcers, etc. Power is supplied from a 12-18 v dry battery or from an automobile storage battery. Identical unit are produced also by the English firm Mimko.

The use of semiconductors in the latest radio-service models is increasing. For example, the Austrian firm Siemens Halske uses semiconductors for its sound and other equipment.

A very favorable impression is produced by the amplifiers and sound-amplifying sets produced by the State enterprises Orion of the Hungarian Peoples Republic, and Tesla of the Czechoslovakian Republic. For example, the microphone amplifiers of the SLA08 panel have a frequency band from 30 to 15,000 cps, an irregularity of  $\pm 2$  db and an harmonics factor of less than 1%. The AK 602 Orion amplifier with four microphone inlets has a frequency band of 60 to 10,000 cps, an irregularity of  $\pm 2$  db and an harmonics factor of less than 2%.

The Dutch firm, Philips, is producing light-weight portable amplifiers, such as its 120-watt El-6431 model which weighs 16.5 kg, operates with a frequency band of 40 to 15,000 cps and an harmonics factor of not more than 3%.

From the engineering standpoint, the amplifiers and sound-amplifying sets produced by West-European firms contain nothing which is unknown to us and, except the latest developments in the field of semiconductors, there is no outstanding originality. Worthy of attention is their carefully executed workmanship and the very high quality of the parts and radio materials. Inas much as high-power amplifiers are concerned, we can claim with certainty that our amplifiers are on a higher level than those produced in Western Europe. It remains for us to study the experience abroad in the field of light-weight portable amplifying devices.

Worthy of attention is also the experience of many firms (specifically of the Hungarian State enterprise Orion) which produce all-purpose sound-amplifying sets containing a great variety of equipment, beginning with microphones and ending with loud speakers; also the auxiliary equipment: microphone stands, cable drums, etc.

Loud speakers. In many countries of Western Europe,

the latest tendency is the use on a large scale of acoustic column type of loud speakers for the propagation of sound in open spaces and in closed buildings as well. Such types of loud speakers are produced by many firms. Due to their use of high-quality wide-band diffuser cones and division of the frequency spectrum into sub-bands, the acoustic columns are distinguished for their good performance. For example, the frequency band of the 10-watt model VE-1646 acoustic column produced by the firm, Philips, is from 50 to 18,000 cps. Its dimensions are 970 mm X 265mm X 165mm.

The acoustic columns produced by French, Austrian, West German firms and by the State enterprises of Czechoslovakia, Hungary and GDR [German Democratic Republic] and a few other countries are of fairly high quality.

Of interest are the diffuser cones of several West-European firms. The English firm, Goodmans, is producing a variety of cones with power ranging from fractions of a watt to several tens of watts. For example, the model AXIOM 22MK of this firm with a power of 20 watt operates with a resonant frequency of 35 cps and a frequency band pass from 35 to 15,000 cps, it weighs 8.3 kg and the induction in the gap reaches 17,500 henry. The 6-watt coaxial cone AXIOM 80, with a resonant frequency of 20 cps has a pass band from 20



to 20,000 cps. The induction in the gap of this cone is also very high.

The high induction and the light weight are the distinguishing features of many types of loud speakers produced by West European firms.

Of interest are the flat and elliptical loud speakers, which are widely used in receivers and television sets and also in various types of acoustic columns.

Still in production is a variety of directional loud speakers, but these contain nothing of engineering interest. True, a certain originality is present in the design of the new directional loud speakers produced by the English firm, Trix, such as the models 403, 603, 458 which are used for sound propagation in buildings. The design of these loud speakers is shown in the drawing. Their power is : from 4 to 8 watt for model 458, 1 to 2 watts for model 403. The directional angle in a horizontal plane of model 603 is approximately  $60^{\circ}$ .

Of interest is also the design of the loud speakers produced by the firm, Elipson, (France). This firm makes acoustic units with reflecting "shells" and loud speakers similar to the directional loud speakers produced by Trix.

The housing of these loud speakers and the "shells" are made of gypsum. The listening to an high-power unit with "shells", approximately 1.5 m in diameter, leaves a very good impression-- the effect produced by the shell is that of volume sounding. Units with small "shells" are used particularly as controlling devices by French radio broadcasting enterprises. The directional action of these units makes it possible to listen to several programs in the same instrument room.

Microphones. The West European firms are producing dynamic, tape, capacitor, piezo-electric and carbon microphones for a great variety of purposes.

Capacitor microphones have found a wide application in Germany, where at this time the firm, Neuman (FRG) is specializing in these microphones. The quality of the microphones produced by this firm is high, the frequency band is from 30 to 14000-15000 cps at an irregularity of 2 db, the microphones are small in size.

Worthy of note are the microphones of the Austrian firm, Akustische und kino gerete. For example, the frequency band of the D-20 dynamic microphone is from 30 to 15,000 cps at a irregularity of 13 db, the sensitivity is 0.14 mv/mbar with a 60-ohm load. The frequency characteristic of

the microphone in the low-frequency range can be regulated within the limit of -7 to -12 db. The D-30 microphone of the same firm has a directional characteristic which can be regulated; its quality indexes are the same as in model D20.

The D-17 microphone is wind protected; its frequency band is 50 to 15,000 cps at an irregularity of  $\pm 3$  db, the sensitivity is 0.22 mv/mbar. The D-12 model with a sensitivity of 0.14 mv/mbar reproduces a frequency band from 40 to 12,000 cps.

Of great interest are the superdirectional microphones produced by several German firms in the shape of rods of more than 1 m long.

Electromegaphones. In the radio-service practice, there often arises the need of a portable sound-amplifying unit. Electromegaphones are widely used for this purpose.

The type 1956A megaphone produced by the French firm, Paul Bouyer, consists of a loud speaker, a 1.8 kg microphone and an amplifier weighing 2.5 kg and supplied with power from a 6-12 v dry battery. The power of the amplifier is 3-4 watt. The audible range of the megaphone is about 250 to 300 m.

The West German firm, Deutsche Electronic GMBH is pro-

ducing the type Gigafon T electromegaphone. According to the firm, its range is 300-400 m and its weight is 2.5 kg. The megaphone is also equipped with a special device for using phonic code signals. This widens the application of the unit and increases its radius of action.

The electromegaphones of the English firm, Pue, represent a constructional combination of a semiconductor amplifier with a source of power, microphone and loud speaker. Similar electromegaphones, except that they have miniature tubes, are produced by the English firm, Minko.

In conclusion, it should be noted that, at the present time, much work is done in our country to improve and expand the engineering base for radio service. For this task are attracted the scientific-research organizations, the operating and industrial enterprises.

Experimental models have been produced of units for simultaneous translation of speeches over the radio (IRPA) and over wires as well (VEF, MGRS). The results of tests are good. The radio units operate in the longwave range, using a loop for an antenna and semiconductor devices. The wire units are designed for eight channels; the station unit produced by the plant VEF can serve up to 1500 listener's sets.

Already completed is the work on the new types of sound-amplifying devices with power of 25 watt X 2 and 100 watt X 2; these will be used with the mobile units installed on the automobiles "ZIM" and "Pobeda". Nearing completion are the sound-amplifying units with a power of 250 watt X 2.

New types of microphones, acoustic columns, horn and radial loud speakers and other radio-service equipment will be produced in the near future,

At the present time, Moscow has a powerful system of radio-service with a large number of automobile type of sound-amplifying units with powers from 50 to 10,000 watts.

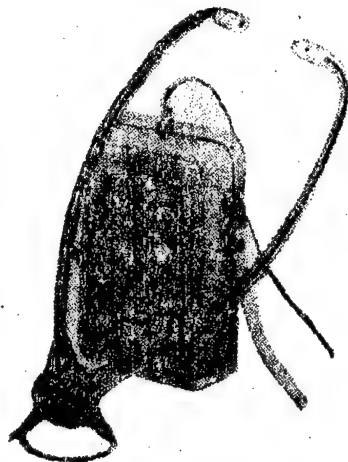
A wide application is also found for portable and transported units with powers of 25, 50, 100, 300 watt and above, which are completely finished sets containing from the microphone to the loud speaker.

Among the automobile type of sound-amplifying units are trailers containing electric stations generating from 3 to 35 kva. In several cases, the electric stations are mounted directly on the body of the mobile unit. Use is also made of trailer loud speaker units made up of high-power acoustic columns.

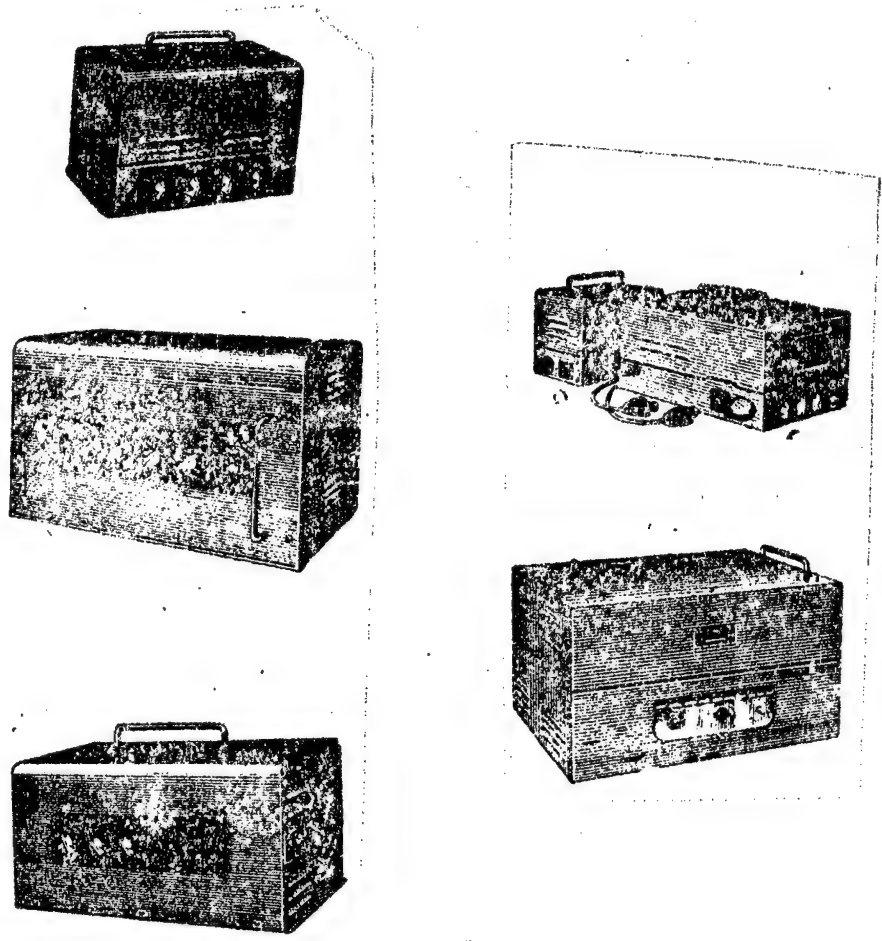
A radio-service system of fairly large size is being created also in other cities of the country.

In this work it is very important to use the experience in the field of radio service which we have accumulated during the past few years, as well as the experience of other countries. We should, however, adopt a critical attitude for the evaluation of the equipment produced abroad since, in many cases, the advertised features of units produced by capitalist firms are not always confirmed in practice.

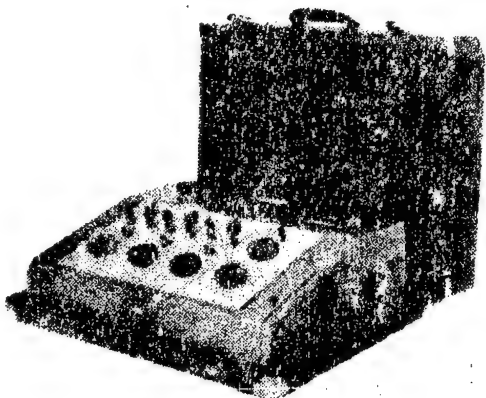
I.A. Shamshin, chief engineer MGRS.



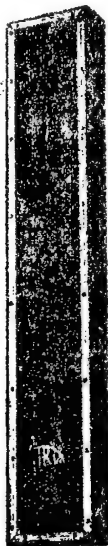
Radio receiver for translating speeches made  
by the Austrian firm Siemens-Halske



Amplifiers produced by the English firm, Trix,:(top to bottom): 12-watt, 30-watt,25 watt, 12-watt with combined power supply, 60-watt.

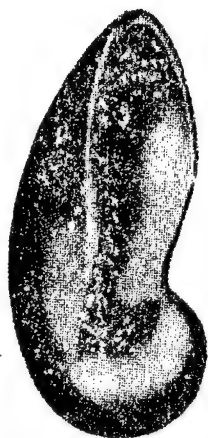
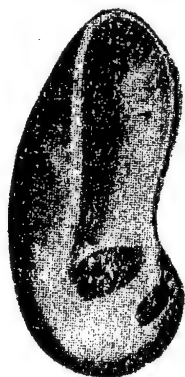


Semiconductor microphone  
unit by Siemens-Halske  
(Austria).



Acoustic column by Trix  
(England).





Austrian D-30 micro-  
phone with regulated  
directional charac-  
teristic.

Directional loud speakers,  
models: 458, 403 and 603  
by Trix (England).

## I n f o r m a t i o n

### THE 14th CONGRESS OF THE WORLD-WIDE POSTAL UNION !

The creation of the World-wide Postal Union (VPS) dates from 9 October 1874, the date of the first convention held in the city of Berne. At that time, 22 countries were members of the Union: Austria, Belgium, Great Britain, Hungary, Germany, Greece, Denmark, Egypt, Spain, Italy, Luxemburg, Netherlands, Norway, Portugal, Russia, Rumania, Serbia, USA, Turkey, France, Switzerland and Sweden, with China joining in 1897. The purpose of creating the World-wide Postal Union was to establish uniform rules for mail deliveries and international postal rates, and also to improve the international postal traffic.

The VPS conventions are called every five years. The last convention of the World Postal Union, the 14th, was held in the capital of Canada, Ottawa, from 14 August to 30 September 1957, in the building of the Parliament. The agenda was prepared long before the opening of the convention; it dealt with the review of the World-wide postal conference, the agreements made on airmail and parcel traffic, review and changing the classified rules on various types of international postal traffic.

Taking part in the convention were the representatives of 96 countries, all members of the World postal Union, including the delegates from the USSR, UkSSR, BSSR and other socialist countries. Among the delegates from the Soviet Union were the assistant Minister of Communications USSR, K.Ya. Sergeychuk (the head of the delegation), professor of MEIS, A.A. Vishnevskiy, assistant chief of the Main postal department of the Ministry of Communications USSR, N.K. Bushuyev, engineer of the foreign relations department of the Ministry of Communications USSR, I.Ya. Petrov. The Ukrainskaya SSR delegation was headed by the chief of the Lvovskaya Oblast communications office, A.I. Sobko; and the head of the Belorusskaya SSR was the assistant Minister of Communications BSSR, I.N. Kvasha. The experts serving the delegations were E.A. Motin, P.A. Kulagin and A.A. Petrenchuk.

One of the most important commissions appointed by the convention, namely, the commission on preparing the program of technical and economic studies of the postal service, was given to the Soviet delegation, in the person of K.Ya. Sergeychuk.

At one of the early sessions of the convention, our delegation stated that the only legal representative of

China can be the representatives accredited by the Central peoples government of the Peoples Republic of China, and that other persons, such as the Chiang-kai-Chek's emissary in Canada, have no right to sign acts in the name of China.

The majority was hostile to the Peoples democratic countries and rejected the proposal by USSR, UkSSR, BSSR and other socialist countries to allow at the convention observers from countries not belonging to the Union, namely, Korean Peoples Democratic Republic, the Democratic Republic of Vietnam, the Mongolian Peoples Republic and the German Democratic Republic.

The questions handled by the commission were later approved at the plenary session of the convention. There was thus established a uniform rate for airmail delivery of printed matter and newspapers, equal to the present rates on airmail delivery of newspapers, or one gold franc per km ton. Changes have been made in the manner of the delivery of postal parcels for medical and scientific purposes containing biological substances and marked: "danger, do not open"; the manner of handling postal parcels with registered mail was simplified. It was recommended that, by agreement between two countries, registered mail can be recorded by account number, and not by name of person. The

weight of bags with parcels was reduced from 70 to 40 kg. Other resolutions were also adopted.

For the first time the Soviet delegation signed an agreement for parcel traffic to all countries of the world. It removed the stipulation contained in the rules of the convention, under which the transition of international parcels through the USSR was forbidden.

The convention has elected new members for the executive and communications committees, whose functions were to continue the work of the VPS during the time between conventions.

The next convention is planned to meet in Rio-de-Janeiro (Brazil).

The proposal made by several delegation, including the USSR and USA, on the establishing an annual "International letter week", was adopted.

The Ottawa convention has adopted and approved the ruling on establishing a consulting committee on postal studies (KKPI) and elected for a five year term the administration of this committee. The administrative council will have 20 members of the World postal union, including the USSR, USA, Australia, Belgium, Bulgaria, German Federated

Republic, Rumania, Czechoslovakia, France, Holland and others.

The council will have three sections: technical, organization and operation, and on economics. The chairman of the administrative council will be the representative of the United States; the USSR representative was elected to the post of first vice-chairman of the administrative council and in charge of the section on economics.

The convention approved the work-program of the consulting committee on study of postal affairs for the 1958-1962 period, during which the committee must handle 44 questions. Specifically, the questions to be considered are:

by the technical sections: plans for postal buildings by taking into consideration the mechanization and automation of the postal service; equipment of small automatic bureaus (the so-called self-service bureaus); cash registers in the operating rooms; mechanization of mail sorting, parcel and other sorting;

by the section on organization and operation: architecture of buildings suitable for postal service; study of mail processing methods for non-uniform and varying loads; motorization of postal deliveries in cities and rural places; delivery conditions and processing methods, etc.

by the section on economics: determination of the cost of postal operations (by the category of traffic); a system of indexes for the general evaluation and analysis of the performance by postal enterprises; a study of labor productivity; methods for classification of postal enterprises, etc.

The documents signed at the convention by the Soviet delegation are in the interest of our country and can be presented to the government for approval.

N.K. Bushuyev, asst. chief of the Main postal dept. of the Ministry of Communications USSR.



The hall in the Canadian parliament in Ottawa, where the Convention held its sessions.

From the past

THE STRIKE OF YAKUTSK COMMUNICATIONS WORKERS

The general strike began in organized manner in Yakutsk, 40 years ago, at the end of February 1918. The strikers demanded the removal from power of the right-wing counter-revolutionary Oblast Council and the establishment of Soviet power in the Yakutskaya Oblast.

An important part in the strike was played by the workers of the Yakutsk post-office. Below are printed the reminiscences of an active participant in this strike, I.I. Bochkovskiy, who recently retired on pension.

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The general strike for the non-recognition of the counter-revolutionary Oblast council was declared on 27 February 1918, in Yakutsk. Taking part in the strike were the unions of unskilled workers, printers, treasury employees, postal, telegraph workers and others.

Before the strike, we, the communications workers, had withdrawn with the approval of the Irkutsk Soviet of Working People 100 thousand rubles from the funds going to the Yakutsk treasury, but which were kept in the office safe. It was planned to use this money for helping the strikers.



On 1 March, the white guard captured the telegraph and, the, the post offices. The capture of the post-office was quite an event. Accompanied with a military escort came the member of the counter-revolutionaty Oblast-council S. Koryakin and chief of the Oblast militia, D. Klingof. Both of them "S. R' S" [right-wing Social-Revolutionaries]. The collective of postal employees was represented by the chief of the Yakutsk office, P.I. Yezhov<sup>1)</sup> and the entire membership of the newly elected revolutionary union of postal workers; the chairman, A.Ya. Fedorov<sup>1)</sup> and members: P.P. Nechayev, I.P. Dudkin, I.S. Fomin. P.I. Ishutkin and myself, as the secretary of the Soviet.

Koryakin and Klingof demanded the keys to the postal office storage room. We refused and Koryakin began breaking the lock with an iron bar. Upon reaching the money-box, they were terribly agitated by discovering that 100 thousand rubles were missing; they grabbed the remaining 400 thousand rubles. As came out later, the white guards used this sum to pay their hired soldiers. Our big mistake was that we did not take in time the entire 500 thousand rubles, which

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1) In 1919, P.I. Yezhov and A. Ya. Fedorov were taken out of the Irkutsk jail by the "Semenovets and were brutally murdered on the shores of Lake Baykal.

would have deprived the Oblast-council of a material base.

With the post office and telegraph captured, the Oblast-council appointed their own commissar. We, the strikers, had no access to the telegraph. The strike was led by the revolutionary Soviet of postal workers. Upon leaving the telegraph, we informed the entire telegraph line, from Pokrovsk to Irkutsk, about the strike to which the entire line joined unanimously; the white guards, although in possession of the telegraph, were completely deprived of communications. The postal service was only for local purposes.

Troubles were plentiful in those days. The reactionary element was in the saddle. Almost all members of the elected Soviet were arrested on 29 March; arrests of the most active comrades were taking place every day. It agitated the strikers and it became necessary to establish communications with the rest of the world. This is when the two Morse sets, taken from the storage room before, came in handy. From time to time, at the instruction of the strike committee, one of the telegraphers would go out of town, connect the Morse set to the line, call the victim city and, by giving the pass-word learn all the news.

Our underground print shop began its operation on 2 April. It printed the first issue of the "Bulletin of the

Soviet workers deputies". It should be said the print shop was working nicely, the bulletins were published in time and it was a big surprise for the white guards, who had no idea of what was going on in the center of the city. Despite all their efforts, they did not find the location of the print shop.

Two telegraph operators remained in the service for the white guards, but they unable to learn how we maintain communications. However, there appeared a new strikebreaker, the former supervisor Martsinkevich, who quickly surmised what the trouble was. Then we had failures, one after another. First they captured P.P. Nechayev with the Morse set and, later, D.M. Aslamov with the field telephone. Both went to jail and the communications which we had established came to an end.

It was the end of May and the river Lena was free of ice. The lack of news was depressing the strikers. At the next meeting of the strike committee it was decided to send one of the telegraphers to the village Sinskoye to contact Vitim and, if possible, Irkutsk. It was necessary to know about the time the red guard detachment left Irkutsk for Yakutsk and its present whereabouts. It was I, who was chosen for this trip. At 4 o'clock of the following morning

I left Yakutsk disguised as a demobilized soldier. I reached Sinskoye in the evening of the third day. The chief of the communications branch, Smyshlyayev, helped me to contact Vitim. The Vitim operator asked for the pass-word and I said "Submarina" and asked for information. I learned that a red guard detachment, 300 bayonets strong, must be by this time in Kachuga, while Kachuga informed that this detachment did not arrive yet.

I returned to Yakutsk by buying a boat (highway traveling was dangerous). We began to wait. Again the unknown, Steamers could go only as far as Olekminsk, they were forbidden to go further.

It was already the middle of June and no detachment. A new trip to Sinskoye was a necessity. I left with A.V. Sanin and as soon as we reached Pokrovsk we were arrested by order of the chief of militia, Klingof, and brought back to Yakutsk. There we had to sign a promise not to leave Yakutsk and pay daily visits to the militia.

Despite all these unpleasant events and lack of news, our strike was not broken and there were no traitors.

Two days later, Sanin convinced Klingof that he does not know me, that I was only a travelling companion and

begged Klingof to allow him to depart to Olekminsk on commercial business. Sanin succeeded in reaching Sinskoye, where he contacted Vitim and learned that a red guard detachment, 200 bayonet strong, is nearing Vitim with Rydzinskiy in command, and that a detachment of 80-100 workers commanded by Stoyanovich left Bodaybo and both detachments will join in Vitim.

On the way back, Sanin was arrested in Pokrovsk and, only by his resourcefulness, succeeded in turning over the tape with information to the supervisor Proshak, who sent it immediately to us in Yakutsk. Sanin was taken to jail.

Days passed one after another while we were waiting for the arrival of the detachment. On 30 June, two steamers with red guards landed at Tabaga, our fighters moved toward Yakutsk. The main force of the whites ran shamefully without engaging in battle. After a short battle with the white guards Yakutsk was liberated by the detachments commanded by Rydzinskiy and Stoyanovich, and this established the Soviets in power. In the evening of the same day we restored the telegraph service and Rydzinskiy, Stoyanovich and the representatives of the Yakutsk workers deputies were able to communicate with Irkutsk.

Thus came to an end the first stage in the struggle

of the Yakutsk worker for power to the Soviets. The communications workers of Yakutsk, during this heroic period, were always in the front ranks of the defenders of Soviet power.

I.I. Bochkovskiy, pensioner

## Reviews and Bibliography

### SPREADING THE EXPERIENCE OF ADVANCED COMMUNICATIONS WORKERS

One of the ways of spreading widely the advanced experience is by printed propaganda. Realizing its importance, the administrative offices and certain enterprises of the Ministry of Communications RSFSR have published last year a large number of posters, bulletins, brochures and informative letters describing the achievements of the best collectives of communications workers, advanced employees and innovators.

Much work in this field was done by the Stavropol', Krasnodarsk, Khabarovsk, Penza, Bryansk, Novosibirsk and certain other communications offices.

By reading the publications printed in these places in 1957, one can see that many offices and enterprises take a good interest in both the contents and the form of such literature.

It is better to note, first, that the bulletins published regularly by the communications office of the Stavropolskiy kray are distinguished by their good style and ably stated material.

In the bulletin published by the communications office of the Kirovskaya Oblast, the advanced communications workers tell of their production experience. Especially it is interesting to read about the work-experience of the supervisor of the line service of the Kirov city rediffusion station, comrade Bakin, who's section is attended with no damages taking place in the lines of the station and in the lines of the clients.

The bulletin published by the communications office of the Arkhangelskaya Oblast leaves a good impression. The material is well prepared and the stories are illustrated with photos. Worthy of attention are the articles in the bulletin by the technician of the Arkhangelsk telephone-telegraph office, comrade Yudenkov, chief of the LTU line sector, comrade Moshin, and by others. However, the brochure on the work by innovators of the communications enterprises of the Arkhangelskaya Oblast, published by the communications office in November 1957, contains proposals which violate the safety rules. For example, the proposal by comrade Uvarov "Automation of the electrical lighting of public telephone booths" proposes to supply the voltage of the lighting circuit without a step-down transformer.

The communications office of the Checheno-Ingush



ASSR has published a bulletin reviewing the performance of communications enterprises for the first quarter of 1957. It cites the favorable results and also discloses the flaws present in the production. This mobilizes the collective for timely action to eliminate the defects.

The bulletins published by the Krasnoyarsk, Orel, Kirov, Omsk, Tatarsk and Yaroslav communications offices contain a number of proposals which could be used with success also by communications enterprises of other Rayons of the country.

The brochure "The experience of advanced communication workers" published by the communications office of the Permskaya Oblast contains the article written by the telephone operator, comrade Motorina "For work of high-quality", a sketch by comrade Varner about the telephone operator comrade Pastukhova and the story written by the chief of the city communications branch, comrade Dmitriyeva. All these are ably written, represent interesting reading and can be useful for workers of similar occupations.

Well published is the brochure "In remote Kyshtovka" of the Novosibirsk communications office containing a description of all activities of the communications workers of one of the best communications offices of the Oblast.

The communications offices of several Oblasts of the Russian Federation have shown valuable initiative by publishing separate informative letters on the work of innovators, or by printing suitable information in the bulletins and in collections of innovator proposals (Khabarovsk, Astrakhan, Arkhangelsk, Krasnodarsk and other communications offices).

It should also be considered advisable for such publications to contain a list of new technical literature, also the proposals by innovators reprinted from the TEKHSO cards with advices for their use.

The collection of innovator proposals #2, which is published by the communications office of the Khabarovsk Oblast, contains a large number of proposals in which many communications enterprises would be interested. The publication of such collections should certainly be continued. In our opinion, however, instead of publishing a large volume, it is better to publish small volumes, but more frequently. It is also desirable to print articles and notes on the work of the best innovators and brigades with their photos.

In the bulletin on innovator proposals published by the communications office of the Kaluga Oblast are printed

proposals worthy of approval, and also a number of ineffective proposals; printed there are also proposals taken out from old TEKhsO cards, which have been adopted by many enterprises long ago (for example, the proposal by comrade Shevchenko). The appearance of the bulletin leaves much to be desired. The same flaws are present in the bulletin of the Vologodskaya Oblast communications office devoted to the results of the competition between innovators and inventors.

The proposal of the senior technician of the Saransk Telegraph, comrade Kozolupov, "Use of an auxiliary battery in lines using Morse instrument in cases of current leakage" has been known for a long time. Yet, it was printed in the bulletin of the Mordovsk communications office.

The work methods of the operator of the Tyumensk city telephone station, comrade Zholobova, described in the bulletin of the Tyumensk communications office are reduced, on the main, to the requirements mentioned in the "Memorandum to GTS operators". However, some of the methods practiced by comrade Zholobova deserve attention and can be recommended to other GTS operators. Unfortunately, the bulletin has a very small circulation, only 100 copies, which is inadequate to acquaint workers of other offices of the Oblast with the contents of this bulletin.

The Krasnodarsk communications office, which is very active with publishing, is devoting much attention to popular description of innovator proposals. A wide application has been found for the many proposals made by communications workers of the Krasnodarskiy Kray, for example, those of the engineer of Krasnodarsk DRTS, comrade Tsuprikov, technicians of ATS, comrades Yakovlev and Dyachkov. Little attention was paid, however, by the Krasnodarsk office to the editing of the brochures describing the proposals and of other publications. For example, the informative letter on exchange of experience of communications workers of the Maykop office and LTU has this title: "Exchange of experience of ST telegraph operators, mechanic ST35 of the Maykop telegraph M. Lytkin". In the article by M. Lytkin are such sentences as "At that time the equipment ST-35 was present in insignificant quantity and was used in communications not in its full power with carrying capacity". "As the pressure weakens of printing the symbol indicates the drying up of the coloring tape-- I replace it" and many other similar sentences. The same defects are not omitted in the brochure by comrade Tsuprikov: "Machine for sealing coils in chlorovinyl insulation", where such phrases appear as "according of this method", "the construction of the construction", etc. The Krasnodarsk communications office

should improve the editing of the bulletins and brochures published by this office.

It should be mentioned that many communications offices do not bother at all with publishing printed matter on exchange of experience (Vladimir, Murmansk, Udmurtsk, Orenburg and other offices). It is due to the lack of a systematic study and diffusion of the advanced labor methods, also to the poor arrangements made to encourage inventions and innovations. Such an attitude to the diffusion of the achievements of advanced collectives and production innovators cannot be regarded as the correct attitude. All communications enterprises can and should publish bulletins, posters, brochures, informative sheets and collections of articles devoted to the exchange of work experience. For collecting, editing and technical preparation of the printed material it is recommended that communications offices maintain a steady group made up of qualified engineers and technicians. The literature phase of this work is advisable to entrust to experienced editors of the local newspapers.

The material published on the exchange of experience can be useful only if the labor methods responsible for good production results are ably described in detail. It is desirable to illustrate the material with photos showing,

in particular, individual labor methods and snap-shots of innovators. Each printed issue must bear the date of its publication.

In calculating the potential circulation, it is necessary to take into account the possibility of supplying the subordinate enterprises and, at least, 2-3 copies each to other communications offices of the Russian Federation.

Sh.Sh. Akhmerov, engineer of the technical department of the Ministry of Communications RSFSR.

B.G. Varshavskiy, senior economist of the Main Postal department of the Ministry of Communications RSFSR.

CORRECTION:

In #1 1958 "Vestnik Svyazy", the 8th line in the left column of page 35 should read: "of the new, postal year, 1858."

Editor M.N. Stoyanov.

Editorial staff: S.G. Vultakh, P.A. Kokoshkin, V.M. Konyukhova, L.A. Kopytin, M.V. Kryuchkov, I.P. Petrushin, B. N. Ramenskiy, M.V. Ryzhov, A.G. Smiryagin, P.A. Frolov, I.A. Shamshin, S.V. Shevchenko.

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TOOL BOX FOR THE SECTION INSPECTOR OF

THE CITY TELEPHONE NETWORK

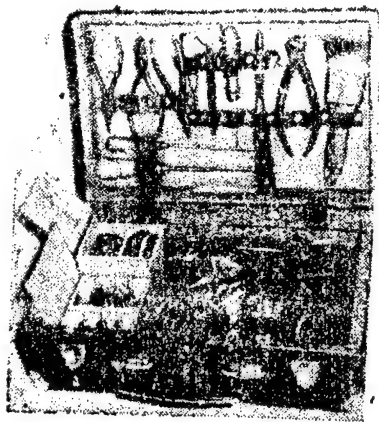
The section inspector of the central telephone of Moscow, I.G. Spirin, designed a tool box (see upper photo) for keeping and carrying tools and spare parts needed by an inspector of the subscribers lines of the city telephone net.

The tools (cutting pliers, set of screw drivers, flat pliers, cleaning material, air brush, etc.) are located in a special place of the box containing also a microtelephone, two dialing sets, six microphone insets, microtelephone and socket cords, etc.

An interesting feature of the box is that the set of tools are located on a removable board attached to the cover of the box.

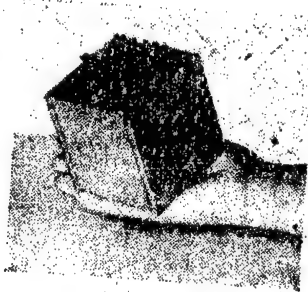
For example, when the inspector is busy with a repair or inspection of a telephone instrument, he can withdraw from the box the board with the tools and place the tools so than he can readily reach any tool he needs.





Creations by innovators  
and inventors.

#### MINIATURE LOW-FREQUENCY AMPLIFIER



Ye.M. Shlimovich, engineer of the Installation department of the trust "Mezhgorsvyazstroy", designed a miniature amplifier for the 4-wire low-frequency service communications channels of the main cable lines.

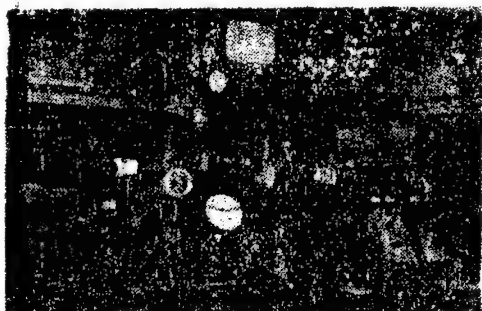
This amplifier, which contains types PlA and PlB semiconductor triodes, balances the attenuation of a cable section up to 50 km long.

The consumption of current does not exceed 6 ma at a voltage of 20 v. This makes possible to use dry cells for the amplifier and to obtain service communications in newly laid cables until the completion of the boosting points and power supply units.

An experimental group of such amplifiers has been produced by the installation department.

REBUILDING THE RADIO-RELAY EQUIPMENT BAY OF THE  
PTS-52 MOBILE TELEVISION STATION

A.I. Shlain, senior technician of the Moscow television center made a proposal to rebuild the bay containing the radio-relay equipment of the PTS-52 station. According to this proposal, the monitor system KU-10 takes up the place of the BPKh-53 pack, and the latter is installed at the place occupied by BKKh-77 panel.



The UF-9 pulse distribution cascade is moved to the place occupied by the BGSh-17 block and the latter is placed in the power cabinet.

The BEKh-77 panel is replaced with a small switching block made with own efforts. The method of switching remains unchanged.

The new arrangement of the equipment makes it easier to control the image at the input and output of the transmitter (with the aid of KU-10) and from the "ether" (with the aid of a reference televisior) from the places occupied by the video engineer and senior radio-transmitter technician.

The photos show an inside view of the PTS-52 station before the rebuilding (left) and after (right).

### NEW LITERATURE ON COMMUNICATIONS

A.M. Broyde - "Manual on electrovacuum and semiconductor devices" (Abridged edition, contains no characteristics and dimensional drawings). Gosenergoizdat, M-L. 1957. 95 pages. Library for the masses, issue 276). Price 2r 90k.

Contains brief information on Soviet and foreign modern receiving, amplifying radio tubes, kenotrons, low and medium-power oscillator tubes, picture tubes, oscillograph tubes, voltage and current stabilizers and germanium diodes and triodes of the junction type.

I.M. Vishenchuk, Ye.P. Sogolovskiy and B.I. Shvetskiy - "The electron-beam oscillograph and its application in measurements". Edited by K.B. Karandeyeva. Gostekhnizdat, M. 1957. 220 pages. (Physico-mathematical library for engineers). Price 7r 20k.

A review of the operating principles, design and operating features of low-voltage electron-beam oscillographs, also basic information on their selection and calculation. Describes the use of electron-beam oscillographs in research and methods of measurement. The book is for engineers, scientists and post-graduate students engaged in designing and operating of electron measuring devices.

G.P. Grudinskaya - "The propagation of ultrashort waves". Gosenergoizdat, M-L. 1957. 64 pages. (Library for the masses. Issue 28). Price 1r 50k.

The brochure covers the basic problems connected with propagation of ultrashort waves and gives information on the latest investigations in this field. It explains the various cases of remote receiving of ultrashort waves and gives certain recommendations for remote receiving.

G.D. Zavarin - "Amplifiers". Voenizdat, M. 1957. 79 pages. Price 1r 40k.

A description of input devices of receiving radars, high and intermediate-frequency amplifiers and video amplifiers. At the end of the book is a table of basic parameters of receiver-amplifier tubes.

M.S. Kaufman and G.M. Yankin - "Electron devices", Edited by professor R.A. Nilender. Part II. Gosenergoizdat, M-L. 1957. 320 pages. Price 7 r 40 k .

The second part of the book contains information on design of receiver-amplifier and oscillator tubes, semiconductor devices, electron-beam tubes, photocells, X-ray tubes, etc. Certain information on electroevacuum technology is also given. The book has been approved as a training manual for radio-engineering technicians.

B.I. Korolev - "The basic principles of vacuum engineering". 3rd edition, revised .. Gosenergoizdat, M-L. 1957. 399 pages. Price 9r 50k.

The book is devoted to methods of obtaining and measuring of high vacuum, methods of locating leakages and their calculation. Contains preliminary information on physics of gases and reviews in the conclusion the problems of vacuum hygiene. The book has been approved as a textbook for radio-engineering technicians.

K.B. Mazel' - "Theory and calculation of rectifiers operating with capacitance by taking into account the inductance of transformer leakage". Gosenergoizdat, M-L. 1957. 40 pages. Price 1r 10k.

Reviews the theory of rectifier operation with a capacitive reactance filter by taking into account the resistance and inductance of the plate transformer leakage. A general engineering method is offered for the calculation of such rectifiers in case of impedance in the rectifier circuit. Derives helpful formulas necessary for the calculations.

New types of start-stop telegraph devices. Information book "Communications engineering abroad". Svyazizdat. M. 1957. 52 pages. Price 1r 65k.

The book contains a general review of the achievements in the field and design of start-stop telegraph devices. and a brief description of two types of page teletypers (model 150 and model 28) developed in USA and the type T-68a tape start-stop device developed in West Germany.

Semiconductor devices and their application. A collection of articles edited by Ya. A. Fedotov (Issue II). Published by "Sovetskoye Radio", M. 1957. 398 pages and 1 insert. Price 10r 60k.

Contains more than 20 articles devoted to semiconductor devices and their application.

Rules on construction of long-distance cable lines. Svyazizdat, M. 1958. 299 pages. (Ministry of Communications USSR. Main department of capital construction. State Institute on research and design of communications installations "Giprosvyaz"). Free.

Contains instructions on methods to be used in construction of long-distance cable lines.

M.R. Reznikov - "Technical information on new methods and propaganda of advanced experience". Svyazizdat, M. 1957. 36 pages. (Ministry of Communications USSR. Technical department. Lectures on communications techniques). Price 1r. 15k.



The lectures review the principal kinds of technical information and technical propaganda which have already received approval by many communications enterprises.

K.K. Stešhenko - "Innovators among communications workers". Sverdlovsk book publishers. Sverdlovsk. 1957. 95 pages. Price 1r 65k.

Describes the work experience of the collective of the Sverdlovsk post-office, who elected for their task the complete improvement of the communications service for the working people.

B.P. Terentyev, I.Ya. Rozentsveyg and B.B. Shteyn - "Laboratory exercises with radio transmitting units". Svyazizdat, M. 1957, 256 pages and 3 inserts Price 7r 80k.

The 26 laboratory exercises described in the book are divided into three chapters: fundamentals of radio transmitting devices, transmitter testing, multi-channel units and ultrahigh-frequency oscillators. The fourth chapter contains a review of typical transmitters, testing and auxiliary devices. The book has been approved as a training manual for electrotechnical communications institutes.

P.D. Tokarev - "Radio receiver tuning". Lenizdat, L.

1957. 100 pages. Price 2r 10k.

The book's purpose is to help the beginner radio amateur to learn how to tune his own make of radio receiver. Contains a detailed review on tuning of individual parts and of the set as a whole. Contains recommendations on how to overcome difficulties during the tuning of radio receivers.

Ya.A. Fedotov - "In place of a radio tube". Published by "Sovetskoye radio". M. 1957. 64 pages (Engineering of the 6th 5-year plan ). Price 90k.

The brochure introduces the reader to one of the most important problems of the 6th 5-year plan -- the wide application of semiconductor materials for the various branches of science and engineering, specifically, the replacement of radio tubes with the more reliable and economical miniature semiconductor devices.

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END